

# DRAGON USER



*The independent Dragon magazine*

January 1988

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No Amd pack for Dragons ... Maplin in-  
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STOP PRESS • STOP PRESS • STOP PRESS •

Peter's three-adventure compilation is  
£399 and not £299 as advertised last  
month. \*Taped listings of Music Extender  
will be available from John Penn.

## Editorial

LOOKING down the tunnel of another  
year, I am going to quietly forget that  
people keep asking "what's going to  
happen to Dragon User?" and remem-  
ber that people have been asking that  
question since 1984 and, like the  
Christmas turkey, we keep right on  
reappearing.

I shall start worrying about that Great  
Friscoes Fan in the Sky after Christ-  
mas. Right now I am staying put under  
the mistletoe. Happy Christmas!

Talking of mistletoe, I had the chance  
to meet old and new acquaintances at the  
1988 Show on Saturday and talk  
things over. Many people agreed that  
there are opportunities for marketing  
Dragon software — for instance, pro-  
ducing legitimate, less expensive conver-  
sions of American Tandy programs —  
which are not taken up because there is  
a better living to be made from other  
machines. On the contrary, dealers  
who have good contact with Dragon  
owners are gradually living off their  
less profitable games to specialist  
dealers who are more committed but  
are inevitably smaller.

More information on reliable, good  
value sources of software and hard-  
ware from overseas would be welcom-  
ed by everyone now.

Telephone number  
(all departments)  
4304343

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### How to submit articles

The quality of the material we can publish in  
Dragon after each month end, is a very great ex-  
tent dependent on the quality of the documents that  
you can make with your Dragon. The Dragon  
computer was launched on to the market with a  
powerful version of Basic, but with very poor  
documentation.

Articles which are submitted to Dragon User  
for publication should not be more than 3000  
words long. All submissions should be typed.  
Please leave wide margins and a double space  
between each line. Programs should, where  
possible, be prepared printed on plain white  
paper and be accompanied by a tape of the program.

We cannot guarantee to return every submit-  
ted article or program, so please keep a copy. If  
you submit a program or program in machine code, must  
include a stamped addressed envelope.

# Letters

This is your chance to air your views—and your tips, compliments and complaints to *Letters* Page, *Dragon User*, 15-17 Little Newport Street, London EC2N 1TP.

## Writers wanted

I am writing on a new monthly magazine for the not-so-serious user called *Dragon Logic*, which will come out in January or February. I cannot be more specific about the dates because of the magazine's early birth only and therefore it will take longer to put together.

*Dragon Logic* will depend heavily on the readers. A vast percentage will be made up of things sent in by readers and suppliers. Therefore I would urge people to send their letters, top ten's, software for review, news, problems, etc. Write.

Readers want to know more about the mag than their place write to me.

Donald Morrison  
12 Dingleburn Road  
Inverness  
IV2 5DT  
Scotland

## Why no '64 games?

I HAVE recently purchased a new *Dragon 64* to add to my old *15L* and am surprised that I have not seen any new *Adventure* games advertised in *Dragon User* for the '64 using its full memory capabilities. Software houses like Microvision have produced programs for use with *Plex Operating System*, *Atari* and *Dragon 64* but have not produced any just for the *Dragon 64* use. The same is with companies who produce *OS-8* software, which needs the *64* to work.

If brilliant games like *Justification* can be made for the *Dragon 32* just think of the possibilities for the '64.

Those software houses read this letter and take note of the points I have made as I do not think I am the only one with this opinion.

Richard Tyler  
11 Madeline Park  
Tunbridge Wells  
Kent  
TN20 5SR

Every month we will be shelling out a game or two, courtesy of Microdeal, to the reader/s who send the most interesting or entertaining letters. So send us your hints and your opinions, send us your hi-scores and suggestions. Send us your best *Dragon* stories. What if you think we are, mind readers?!

EXTRA  
PUFF

## Why oh Why The users cry

I would like to protest about the high prices of *Dragon* kits and disc drives. A new disc drive costs £300+ with £600 cartridge and new *Dragon* kit costs £175. Why? Surely companies would sell more products if the prices were lowered. No wonder there is a booming trade in second-hand kits and disc drives.

Remember one of the other computers—the *Atari 800X*. You know the one where programs on cassette take a long time to load. Like international Kanto in 20 minutes. A few years ago its popularity was dying and the makers decided to drop the price and now it has recovered and is selling well. Shauler's this approach be adopted for the *Dragon* to get it back in the shops as the user base increases to what it was back in 1984 or even before that?

I have noticed some games for the *Dragon* and *CoCo* from America that are quite good. One is *Brain Master* by Tom M. and others are *Zeaxer* and *Polygar* by Dataeast. Why hasn't someone licensed them to our best UK as they are brilliant games up to *Check* *Dragon* standard.

I would like to congratulate *Quick* *Upstart* for *Superkid* and *Play Force* (yes, I like it) and *Microdeal* for *Airball* and also the other companies for still supporting the *Dragon*.

My final point is regarding *Dragon* shows. Why hasn't anyone (except Microdeal) put a *Dragon* show on in Birmingham? I know exist you know. I think it's ideal—central, easy for most people to get to, considerably cheaper than London, is the case of anything south of Watford Gap (and more recently South of Essex) is ignored?

Mr. E. Hunt  
11 Denmark Close  
West Bromwich  
West Midlands  
B70 5AU

We strongly suspect that the answers to most of your questions is that *Atari* managed to develop into a very strong and successful company before it ran into rocky waters, whereas *Dragon* decided not to enjoy half as much success before trouble hit them. It helps to have friends at the bank if you want to re-launch your products.

In reply to your other question, what? You mean there really is something about Watford Gap and *Crash*? I thought it was all just Birmingham. Seriously though—why doesn't someone put on a show at the NEC? It's central, purpose built, plenty of room to park . . . but have you tested their Cornish pasties?

## Now we do the homework!

I would like to compliment you on an excellent magazine and I think October's issue was probably the best for ages. Not only packed with interesting information, it also helped me complete a maths GCSE project.

The problem was to find the amount of tangential diagrams and work out a solution. I was given the problem on 24th September, my Dad and I were stumped until I understood the *Dragon User* arrived the very next day! Looking at the competition, I saw a little table accompanied by a large diagram. When I read the explanation I realised there was my problem and equation neatly documented for me.

Keep it up *Dragon*, much appreciated.

Daniel Swan  
118 Upland Drive  
Denford  
Aylesbury  
PL20 8AG

## Bulletin board bulletin

WHILE I was working on this issue, I was struck by a thought. After awhile I realised that I had not thought about the bulletin board. How about a monthly page devoted to bulletin boards? Readers could be encouraged to send in details of the boards that they use and a brief article (or two) published. An occasional feature of particular boards could be highlighted. I don't know how popular it would be but it may be worth a try.

A.G. Smith  
33 Slack Road  
Bass  
Kent  
CT14 6ND

If anyone wants to send us details on their bulletin boards, we'll print them. We have something on *BDs* in the pipeline, in fact. As soon as I can find a co-pathanger, I'll try and fish it out.

## Transatlantic Telegraph

I should like to extend a letter to Mr. Randy Longshore in the July issue of *Dragon* (letter). He comments on my CoCoDragon Basic converter published in the April issue.

Of course, Mr. Longshore is correct when he states that a Dragon cannot read CoCo discs, at least not directly. It is a great idea to use the procedure to modify CoCo discs in a Dragon and will most definitely contact him in this respect, especially since I myself have just begun work on a program that would copy all files on a CoCo disc to a Dragon disc. However, though a Dragon user might need to find a CoCo disc somewhere prepared to copy files from disc onto cassette, Mr. Longshore's opinion that my program would then be more or less superfluous oversimplifies matters.

First of all I should like to emphasize that not all Dragon users have disc drives, and that they cannot upgrade, even though it tries to deal with disc Basic (as well as file formats), not all Basic software need necessarily come from a CoCo user. With my program the Dragon user also accesses to commercial software written in Basic, eg the compilation tapes published by Jamco Group, the American Rainbow magazine. This gives the Dragon user the ability to tap into the immense software pool available for the CoCo, albeit in a very limited sense.

Far more important, though, is the fact that it just will not always do to ask a CoCo user to save Basic files in ASCII. It occurs quite frequently that Basic programs which have been packed by removing superfluous spaces and by converting Basic lines to compactly saving them in ASCII tokens are replaced with longer ASCII text, and long lines may interfere with the result that ends of lines may be chopped off while saving to cassette. This may even happen with "normal" programs which have very long lines. This is not conjecture but sad experience and was one of the main reasons for writing my converter in the first place.

I appreciate Mr. Longshore's interest, and feel that readers of *Dragon* User can only profit from

thinking of exchange of information in the only large-scale medium available to Dragon users. I am of course interested in further comments or suggestions regarding my program.

Andy Dugan  
Adrian Street East 4-22  
B-5200 Bridge 2 psi, Andover  
England

## Screens x 4

SINCE I have been the Dragon programmer emeritus, I would like it that someone out there will write software to create graphics on four PAGE0/04 screens linked together. You write code to use only the usual grid size, but cannot surround the screen that will be a grid of 256 x 256 (102 x 102). This is a better way to use a screen, by moving around with a kind of spying glass that will double every dot's height and width. Anyone will be able to do it after a while, won't they?

I'm writing for you or know ones. Please send what you have done to DU.

Cliff Hader  
Haver, East 3rd  
East Haver, 20000  
Utah

## Where is Tandy?

COULD you please include the address of the Tandy User Group in your next issue of *Dragon* User. I have tried every address I could find to try and track them down without luck, and so I write to you.

Doug Gilson

HAVING made enquiries, it seems that the Tandy Users Club no longer exists in this country. I am told that one of the Northern Dragon Clubs inherited some of the membership of the old group, but I am not certain which one or what their address is at present. I will let you know as soon as I can find out. Also, the National Dragon User Group deals with Tandy as well as Dragon interests. They are at 6 Ravenna Road, Welling, Sussex.

## Range right

MAY I take this opportunity to give a pointer to the author link rate on a 144? Location 44 FMM controls the rate, price it with 1 to give a constant that does not vary when you add down the scale bar, and POKE 260,55 to update the screen. POKE 44, FMM, 5-POKE 260,55 to turn off the screen.

I also send a right justify routine which will take a line to A8 and justify it to a line length contained in variable L8, returning the justified line in B8. Has anyone got a better method.

```
100 RIGHT JUSTIFY
110 A8 = "This is just an
example"
120 A8 = A8 + " "
130 L8 = 32:F = 0:G = 0:N = 0:
P = 1:L = LEN(A8):B8 = ""
140 GOSUB 200:GOSUB
200 IF P = 0 THEN L = L
150 L = L - P:F = P:P = P
160 IF P = L THEN
N = N + 1:GOTO 140
170 IF N = 1 THEN B8 = B8
180 P = 1:GOSUB 200
190 SP = L - L + 1 + 2
200 B8 = B8 + STR$(G)
(P,1)
210 GOSUB 200:GOSUB 200
220 GOSUB 200:GOSUB 200
230 B8 = B8 + MID
A8,P,P:P = P
240 GOSUB 200
250 IF SP = 0 THEN
B8 = B8 + " "
GOTO 220
260 IF P = 0 THEN B8 = B8
270 B8 = B8 + STR$(G)
(G) + 1:GOTO 200
280 IF MID(A8,P,1) = " "
THEN P = P + 1:GOTO 260
ELSE RETURN
290 P = LEN(MID(A8,""))
RETURN
300 B8 = LEFT$(B8,L8)
310 A8 = B8:PRINT A8
```

## Fjord calling

THANKS for many excellent magazines. I wish to thank all software writers/publishers for all the superb games/programs that have arrived. One year ago all my Commodore

owning friends have no idea of the quality of the Dragon games. Now when they have seen *Dragon Master Plan*, *Joe Gardner* and others, they regularly come to me to play my Dragon games. I even have an Amiga-owning friend who likes my games.

And a last thanks to *Dragon* User. I read every page of it every month.

Continue Method  
Ten Hells Star  
Ullevaker 37  
7502 Karmøy  
Norway

## Norway club

WE would like to tell you and your readers that there is a computer club for the Dragon and Tandy CoCo in Norway.

We have a recently newsletter. We have members from all over the country in Scandinavia. We'd like to get in touch with other computer clubs all over the world.

If you want to know more about our computer club and what we are doing, please write to us for more information.

Trond Dragon/Randy Club  
Sørensen  
A-1000 Kjøbenhavn  
Norway

## Tyne and here

JUST to prove that the Dragon has a strong healthy following, could you please give a page to represent the NORTH EAST DRAGON USER'S CLUB. We have 14 members and meet every Wednesday 8.00 pm in the Etchick lounge of the Concord Mill, Gosforth Rd., Sunderland. If anyone can make it we would be pleased to see them, or they can contact me.

Chris Johnson  
20 Wellingham  
Sunderland Village  
Wellingham  
Tyne and Wear  
NE20 7HP

SUPPORT your local Dragon club.

# News desk

If you'd like to try new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

## Harris front end KLIKs

HARRIS Micro Software's new complete front end and line editor, called the KLIK Utility, is now available.

The package features point and click operation of the entire system from the keyboard or a mouse, with pull-down menus, pointers, a dialogue box, control buttons and help messages, selective directories, file icons, repeating DOS commands and a set of macros for easy control of the screen, windows, SPEAK, etc.

The word-processor like line editor has trace and pause facilities, and desktop facilities

include a disc based speaker, memo-pad, snapshot and PK, JK, Basic, which allows you to design your own windows, icons and menus.

There is, however, no snapshot function, as featured in one of our advertisements. Bob Harris says that he will give some thoughts to whether or not he should include it when he works out what it is.

The package costs £14.95 from Harris Micro Software, 48 Alexandra Road, Hounslow, Middlesex TW20 4HF. Bob Harris's Basic 42 was one of the best Dragon packages of 1988.

## More from The Solver

SIMON Piergrave is pleased to announce the arrival of his latest adventure for the Dragon 32 and 64, the fourth in the Starcrash series.

The Hero of Tyos is an unusually large, 200-location adventure in a fantasy, with many associated module characters and events, some of them interactive. The split-screen game will accept full English sentences.

You play the Prince of Tyos, placed inside a mysterious pyramid by a rival monarch. To win peace for your kingdom,

and the kingdom, you must succeed in escaping. But your rival is devious and not to be trusted. To find the mysterious Amulet of Tyos is easy, but escaping alive is more difficult...

The game is randomised so that it will play differently on each occasion. Do you, alas Simon Piergrave, decide to accept the challenge?

This and all Simon's games are available for £5 each (includes play from Casper Hill Farm, Uley Dunsley, Gloucestershire GL1 5BH).

## New editor for Dragon Update — same old plea

THE November issue of Dragon Update, looking white and shiny, has just dropped out of the postman's bag and onto my foot. Why it's bundled up with two out of three mail. Why am I starting so close to the postman? He's not — I had to carry it up the stairs myself. Our postman may be late, but he's not stupid.

This is the first issue by new editor John Barry Caruth, and Paul Edwards has insight out of the effort, which is fairly praiseful. This month's issue features Pascal for beginners (part 4), Memory Management on the Large Dragon, Easy Machine Code (part 14), Port part 2, a report on disc controllers (DIOs), some notes on the Touchmaster Graphics pad, a couple of games reviews, a supportive assessment of Dragon User since the Great Change (it's ironic to mention

one who can live without a full colour cover), and some thoughts from Paul Grade on copyright and circulating material. And yes, Paul, you're right, as professionals do have someone to make the coffee for us. He's called Russell Hobbs, and if anyone would like to organise a workshop, we could buy him a new lot for Christmas.

Harry is, as usual, appealing for more material. Sometimes I have a lot of fairly old submissions which just missed being published and which the owners don't wish to be returned. I wonder if it'd be of any interest in looking at some of that...

Contact Niall at 61 Riverside Road, Mallow, Sussex, or send material to Barry Caruth, 132 Donaghadee Road, Bangor, Co. Down, N. Ireland BT20 4AH.

## Harry Whitehouse upgrades his power supply for the same price

THE famous AI Supersmooth Heavy Duty Power Supply has gained a couple of extra features at no extra cost, thanks to Harry Whitehouse.

The AI, which carries a two year guarantee and lifetime service warranty, is suitable for the Dragon 32 and 64, and recommended for all Dragonplus owners.

It now features a rapid reaction on/off switch as standard. This means that the Dragon's own fast-pace switch can be left permanently 'on', reducing the risk of failure.

A new design of D-connector has also been introduced, with a reliable safety clamping arrangement instead of a grub screw.

The AI Supersmooth still

costs £18.95 and £24.95 net post and packing. It is manufactured by Peaksoft, and is available from Harry Whitehouse, 48 Queens Street, Bolton, Greater Manchester, M4 3JL, tel. 0608-765226.

"Quite a few owners have told us that they are purchasing an AI as a backup for their original Dragon unit, but we always suggest they use the AI and put their old unit in the cupboard. After all, if an AI ever failed — and to our knowledge that has never happened — the user will at least have the security of knowing that it is covered by the guarantee. On the other hand, if a Dragon Data fails, all you can do is throw it in the dustbin," said Harry.

## 69 Microcosm this month

69 MICROCOSM, the journal of the British Group has also just turned up. Contents include An Editorial Plus Disk Format Program, a look at the Atari 1040ST, disk type reporting, letters, 69 Micro Group Library, a guide to the use of 6801 PinA control register bits, Coco 3 update

review, and some news and personal system reviews. The group holds regular meetings in the London and Birmingham areas.

For information contact Keith Barnes, 170 Glen Ayr, Gifford, Winterton, London SW46 6H3.



## Image scanner from Epson

FOR the wealthy and ambitious in the desktop publishing world, Epson have come out with a low-cost, entry-level image scanner as an option on four of the company's printers, the 6300, 6300+, 6300+ and the 6300+LC/8000+.

The bundled software with the scanner is, surprise surprise, compatible with 6801 PC compatible machines, and the device costs under £200 and can read areas of 8 1/2" x 11" with the EX3000 and LG machines, and 6 1/2" x 11" on the EX3000.





## Trapped in a castle with The Mad Cook

**Title:** *The King's Quest*  
**Supplier:** Simon Margrave,  
Chisley Hill Farm, Uley,  
Cotswold, Glos. GL11 5BN  
**Price:** £5.90

THIS is the second in a series of four adventures by the Solver himself. Knowing that he hasn't even solved the fourth one himself without cheating suggests that the others might not be exactly simple.

After a few loading problems at my end (sorry, Margrave's probably sending someone round with a megamallet to beat up my cassette player at this moment) the game loaded and ran automatically and then you're free to roam the castle mainly at your leisure.

In this program you play the role of Kungur who is still trying to get home after being helped in Starcatch (the first title in the series) and who has now got himself trapped in a castle. Your job is obviously to free this

hopeless character, although this is easier said than done.

Your first location is the courtyard from where you can go south, south or along a narrow side passage. Other rooms nearby include stables, kitchen and library, although the sprinkling of potentially useful objects for you to get hold of.

Then it's upwards via a 'magnificent staircase' to a floor of bedrooms and stairwells. Also on this floor is the tower of knives which has within it objects like a gold key and brass trumpet, but it is deceptively easy to get lost in the maze.

The tower of Mirrors is easily accessible on the Eastern side of the first floor, but your passage to the Western tower is blocked, an inscription on the wall reading it is 'noty flamed in reverse' — to progress into the tower simply solve the riddle.

To succeed in this game the art of solving riddles is not the only skill required, but also

strategical tactics. For instance there are various violent characters wandering about the castle such as the Mad Cook and the Prince who will frequently come knocking at you. Tactics are needed here to decide whether your strength is quite enough for you to defeat the boulder or whether to flee as quickly as possible — although you also lose your possessions. One person who is slightly helpful is the Philosopher, although he also disappears too quickly.

As well as your strength other Knight-Darwin-style features are the fact that you need a minimum score and experience level to enter, although it should be stressed that these minimums are not the maximums. Weight is another problem — not the size of your stomach, but how much you are allowed to carry. Some objects naturally weigh more than others, such as the sword found in the first location

which weighs 2000 of a possible 3000 units, not leaving you much room to carry much else.

The only problems with the game are the cost (five pence given for your responses, the 'time passed' message often appearing while you're entering a command), the fact that you have not been redesigned, but this can hardly be called a fault.

Otherwise there's not a lot wrong with this game. One particularly useful feature is the 'What' command which displays on screen all available verbs, thus helping you find the right phrase when you know what you want to do but don't know how to do it. This feature is just one indication of how much time and thought the author has put into this well-designed game which is well worth taking a look at.

Philip Scott



## Follow the road from The Solver's Arms to Purley

**Title:** *The Quest For The Missing CP/Lib*  
**Supplier:** Simon Margrave,  
Chisley Hill Farm, Uley,  
Cotswold, Glos. GL11 5BN  
**Price:** £5.90

NUMBER three from Hargrave's series — it's getting as devoted to writing adventures as he is to solving them.

Starcatch wasn't too hard for about the first 10 locations; *The King's Quest* wasn't too difficult until all and sundry started attacking you. The latest quest isn't too hard until about the first location. It's a good job the author also supplies solution sheets, although I haven't resorted to them yet — emphasis on yet.

What sets this apart from the previous two games is that here Hargrave's uniquely you have not one but four characters to control all of which have their own skills and aptitudes. You can switch between these characters by use of the 'person' command and each can

do such things as eating and sleeping with problems that can require not just one but two of the characters to solve them. The quiet character splits up and go their separate ways by using the command 'split'.

The game begins in the 'Solver's Arms' public house with a landlord called Thylar (poor chap). Unfortunately your characters start getting philosophical and are told to disappear into the night. So off your characters are with odd articles like a computer tucked into a handbag and with four controllable characters you have four times as many hands and peckers.

So set into the world you go onto the A47 (luxurious setting for an adventure) on the seemingly endless road to Purley (and a long and truly real that one is too — it's) with only a policeman in sight. Now that policeman is found to be useful, isn't it?

After ignoring the first rule of delivery (try — to examine

everything — I eventually managed to find the meeting place by disappearing down a nearby manhole and reappearing in a park).

Looking in the park is a wall of worms (that's what it says) and a box of marching harmonies (that's what it says again). Indeed there is a mad scene of horror apparent through out the game slightly reminiscent of that old devil *The Cockfield* incident except that it is harder and more playful.

There are only five locations here, less than in the previous two games, although each seems to be unique rather than certain repeated ones as in *Starcatch*. As the game is more complex though the reduction in locations is natural.

The 'What' command is here again revealing all commands this time all of which can be entered in three letters, for example 'transfer' is 'fa. As with *The King's Quest*, the game is written in real time and therefore if you ponder too long, 'life

passes you by' will flash up on screen. If the pace is too quick, though, you can always 'wait' and stop your time.

There is however no 'score' feature so you can see how little of the game you have managed to complete, especially when you realise what you have to discover to end your search.

So that's the third in the series, not as easy to get immersed in as *The King's Quest* but more complex and challenging, certainly not a game to knock off in a couple of evenings. As for tonight's probably 4 like *King's Quest*, but as I only have that four dragons, I'll give this five in the hope it will induce the reader to keep buying software. The next in the series was randomly placed somewhere, like *Madness* and the *Mistress* — I can't even manage the ones where the objects are static.

Philip Scott



# Expert's Arcade Arena

Write to 'The Expert' in Dragon User  
13-13, Rifle Wharf St  
London WC2R 3PP.

GREETINGS, viewers. Let me start by saying that I hope you are all about to have a Merry Christmas and a Happy New Year, though I haven't had a single Christmas present from you (probably because it's only November, but that's not the issue, is it?)

Moving swiftly to an apology from me (yes, I do hand them out occasionally — make a note in your diaries, without my fingers crossed, I must say that I'm sorry that the Arena has been on the air somewhat irregularly recently, but fear not, for I'm here for another series (however long). Don't forget to tune in every month.

All this creating is leading up to an appeal. I've finally got a 'round table' and decided to broadcast some requests for help on behalf of myself and (mostly) my devoted public. If you can offer any solutions, then please send them in. My postman has now recovered from his hysteria, and ghosts as he waits post the hospital without even delivering a single entry form for the Readers Digest Prize Draw. The warehouse I bought last year to store all your letters is now so empty that I've rented it out to film Michael Jackson videos in!

So, below in glorious technicolour black and white is the list of essentials that I like you, my loyal servants, to help with if you can.

## Expert pleads

1) An answer to the question: 'What does Snake do, on completing level 5 of Back Street?'

2) Does Universe II of Total Eclipse really exist?

3) A program using the information of so many years ago (DU November 1990, to be exact) concerning the way screens are stored on Commodore EPP, to make a screen designer.

4) What are the codes at the end of each screen on Time Doctor? (Sounds familiar!)

5) A map of Jet Set Willy's. Believe this isn't an official game, so don't try to buy it, but there seem to be millions of copies in circulation.

6) A list of the information that you receive while playing the game section on The Death of Socrates.

7) Any PCOREs at all for any of the following: Mid-Play, 0100, Glaxxon, Chairman, Screaming Archies, Superkid, Mission, Mover's Dream.

8) More maps. How about one for Mafuku Man?

9) The official solution to Escape.

10) A way of upgrading the old Bank to Dead to the better version without power surges.

## Not too hard

Now if all or any of that lot's too hard for you, how about something you can all agree, regardless of IQ, IQ2, no IQs, etc? This is your chance to vote in the rest of the year, **The Expert's Total Software Survey**.

All you need to do is copy out the questions below along with your answers, of course, and send them to the usual address, where the editor will get them submitted up with the competition entries. They will then be forwarded to me and evaluated by my own fair hand, with a little help from Oluppu, my computer.

You may send in as many entries as you like, so long as you use a different name, address and style of handwriting for each.

Here are the essential categories for which you must nominate a winner:

1) Best arcade game for the Dragon — from the year dot to 1995. What has been your favourite game?

2) Most Arcade game — yes, I want to know what is the most utterly awesome game in the history of the Dragon.

3) Favourite Programmer — you could say this one is unfair to single out someone as the best Dragon programmer, but there are a lot of good programmers out there, and it's about time those who've been working the hardest should get some credit. Here's a few suggestions: Kenneth Kuhlman (well known for games such as *Invaders*), Revenge, Danger Ranger, Escape, Phasion, Slays, Devil Assault, Outburst in the Jungle, and more.

## Best Programmes

Roy Cooper has produced some good games — Mover's Dream, Jet Set Willy, Jean Steller etc. More recently Jason Patou has made a name for himself with titles such as *Mover's Dream* (which we are still trying to obtain copies of from Monochrome — all jaws). Eddie Steady Go, John Martin is another faithful choice, famous for Mover's Dream and Jet Set Willy.

There are many programmers to vote for, but why don't we see their names on adverts? Usually the name of the game, and the software house appears, which brings me to the next category:

4) Best Software House — I considered splitting this into two parts, those surviving and those who have given up, but decided to make it a mixed bag. Here are a few names: Microdeal (Arbit), The King, Time Parat,

Speed Racer, all the Outbursts, Inventive Motion Creations, Kidology, Black Book, Eddie Steady Go, Quickdraw (upstairs), Shadow Master, Fire Force, the Golem series, Tom Mix (Cuber House), Bell, Claviers, Rasterpillar 23, Maddy (Olympic), Boulder Ocean, Kame-Kang, Jung'N, Don't forget of course Hewson, Salamander, Peaksoft, Design Design, Morrison Motors, Infoburns House, and Mazeronic (oh, sorry, misprint. Did I say Mazeronic? I meant to say Software Projects) who have all produced some great games.

5) What's the most annoying aspect of any game? For example, the fact that you can't play Hungry House without cheating, you can't see a joystick for Olympic, and you lose all your lives if you die at a monster's start position on Jet Set Willy.

6) Most underrated game — which game was under advertised, underused, but is really good? Here are a few ideas: Steam Roller, Rigo Jo, Atom on a Mopler, Gears, Joe Gattini, AC Ball.

7) Most overrated game — which game turned out to be less like its adverts? My suggestions would be Hammerball, Drone Databases, Space Shards, Module Man.

8) The game you would most like to see converted to the Dragon — there are a lot of good arcade games not yet in Dragon versions. What would you most like to be zapping to by this time next year? (For example, Chuckie Egg's (various computers), Phoenix (arcade).

9) Best music to rap to. Type AUDIO ON before you load EDDC a game, then insert a music cassette during play, and you should be able to 'rap away' with a musical accompaniment. This is a long standing question and should be resolved once and for all.

10) Program which you would most like to see hacked — without telling me when game you would most like a cheat for and I'll challenge the many hackers out there to see who can come up with the goods first.

11) Next game printed in DU — there have been some great games such as *Plan-Play*, *Copied*, *Atom Hunt* printed in DU. Which is your favourite? (By the way, don't submit any hacks for games printed in DU.)

## Expert answers

So, these are the questions. Send off your answers to reach DU as soon as you can, and I'll do something about them as soon as I can.

That's all for this month. Thanks for all your letters, keep them coming in. I'll back next month with the usual hints and tips. Goodbye.

# Introducing Modems

*Kan G. Smith takes the computer to the phone*

NEVER in the short history of micro-computers has a peripheral created more interest than the modem. The word "tackler" entered the language and headlines were made by people leaving naughty messages in VHS electronic mailboxes. A young tackler in America managed to get into the Pentagon mainframe and was arrested by the FBI, or so the story goes. Hollywood took the fantasy one stage further in *Johnny War* (James), with scenes of a nuclear war being evidently started by a young man with a micro. So much desire has it created that for some people it is the first gadget they buy. For those of us that for comparison's sake have only just joined the on-line or are more importantly those who are considering joining, hope this article will help you to find out what a modem is, what it can do for you and what you can do with it.

## How it works

When it comes to computers, the advertising people seem to fall into the trap of assuming that we are all experts, so the first job is to explain briefly how the modem works. The name is an abbreviation of "modulator/demodulator", and what it does is to translate the binary ones and zeros into audio frequencies in a similar way to that used by the cassette port. The system uses analogues pitch for a one and another pitch for a zero. Using this system the computer transmits its information down the phone line and receives the opposite, converting the sound waves into ones and zeros, to receive. The rate at which this data is exchanged is called the baud rate and is quoted in bits per second, one bit being a single one or zero. Baud rates are being quoted less and less these days and are being replaced by "V" numbers, which at first sight seem even more confusing; a brief guide follows:

V21: baud rate 300 receive and transmit, very popular with modem users in America and early users here, now losing ground to V23.

V22: baud rate 1200 send and receive, little used at present but gaining popularity.

V22bis: this is a business users' system for people who have money and sends and receives at 2400 bit per second.

V23: often quoted as 120675. This is the most popular system. Receiving at 1200 baud and transmitting at 75, it is used by most view data systems and many bulletin boards.

Full-duplex: This is a much less fully interactive system and I do not know of any

modems that do not have at least one full-duplex mode. Some will operate full duplex in V23 and half duplex in V22. The difference is most easily explained by comparing the difference between the telephone and a two-way radio. On the telephone, both users can talk at the same time, interrupt each other and even speak full duplex, whereas on two-way radio, one operator must give over of message signal and cease transmission before the other can speak (half duplex). In fact, with a half duplex system, if both parties try to transmit at the same time nobody gets anything, just with the radio. Adventure games sometimes use "FullDuplex" as a means of indicating that the machine will send and receive at the same baud rate, at the same time.

Xmodem: this is a protocol governing the way information is transmitted and received. It makes data transmission more reliable (reducing the possibility of data loss) and allows your Dragon to talk to any other machine. As long as they are both using the same baud rate and the same protocol any make of computer can converse with any other. Most bulletin boards operate on Xmodem system.

Auto-dial: speaks for itself really, as it enables you to keep a personal phone directory on your computer. Once programmed, the machine will call anyone you tell it to call, which also means that you do not need a phone to operate your modems.

Auto answer: also self explanatory, only necessary if you want to run your own bulletin board. It is important to remember that a modem is operated through the RS232C port so if you have a Dragon 32 you will need an input/output cartridge with this facility.

Artis stage of the game you need to decide why you want to get "on-line". If your aim is world domination by Friday, forget it. The military have switched all their important data onto microwave transmissions, and if you can afford to interrupt them then you probably don't buy a Dragon. Choosing the balance on your credit cards is not as easy as some might think, it takes a lot of time and know-how to penetrate such a system, and if you are capable of doing that then you are probably not going to bother reading this article. Anyone searching for a reason to get online really need look no further than electronic mail. There are several systems available at the moment with more to come.

## Viewdata

These usually operate on Viewdata, which in addition to text, also gives a limited graphics capability. To use, these systems you will need to be in P8000A, as no

colour is available. However, if like me you are a black and white television and a single colour printer, then colour is of little consequence. Most systems will have a local number for you to call, the host computer directing your message to the recipients mailbox. When he next uses the system he will be told that there is a message waiting. He can read an reply immediately or save it to deal with later.

## Bulletin boards

Another week a pursuit comes with the use of local bulletin boards. These normally operate on an ASCII scrolling screen principle, using the normal refresh screen with file transfer under the BACODEM protocol. Here you will find sales and want ads, programs for you to download, a place to air your views to the world and a store of all sort of people willing to help each other just for the pleasure of doing it. Some boards will expect some form of subscription but most are free. Many special interest groups set up their own boards. My local one was set up with dentists in mind but the systems operator or sysop doesn't mind people with other interests using it.

The adventures among us will lose another facility that is available to modem users, namely MUD. Even for Multi-User Dungeon game this is similar to Dungeons and Dragons on an adventure game bulletin board. At the moment you are not just playing against the computer but you are playing the game with their own identity within the game and the participants play against each other with the computer acting as referee. There is usually a subscription fee but for the hardcore adventure, the infinite variation will make it worthwhile. Armed with this knowledge and the fact that some of the long standing bulletin boards still use V21, you should be in a position to decide which device you want to buy.

## Software

Once you have settled on which modem to buy, you will need the software to drive it. If possible, buy it from the manufacturer, but there is a few people writing for the Dragon these days and if you want a particular modem, you might have to go elsewhere for the software to drive it. There are two different levels generally available. The first is somewhat basic, which is not to say that it isn't very useful, it would normally consist of two or three programs. Firstly there would be a Viewdata system, this would give you all the Viewdata graphics and text on a forty column screen. All messages would have to be entered via the keyboard while on line

and to save messages you would have to save the whole screen to disc. The Asci program for bulletin boards would operate on the standard 30x80 screen which can mean some very rapid scrolling since most boards operate one-40 by 84. The result of this is that each line on the board will occupy two lines on the screen. All incoming data can be stored in a buffer and saved to disc at tape at regular intervals. This is sort of software you would expect to find bundled with your modem and is best described as adequate.

There is one tale that is certainly no myth, namely that a modem can get you in a whole lot of trouble, especially if you are not the one that pays the phone bill. The last thing that you want is to come home and find all your equipment has been sold to settle up with BT. So study your phone bill, make note of all the codes marked L, and use those in preference to others. Also, check all those with a charge code a or bi, these are your reserves. Keep the time down and you should be okay. Any code with a charge code

nothing out of it save the satisfaction of helping the rest of us. So before you log off leave a message for the sysop to tell him what you think of this board. It might make his day.

Below have telecome numbers you might find useful.

6800 Board 1200/75 01-268-7600 24hrs  
Minsky 060/000 0600-773464 Sat-Fri  
2700-0000



At the other end of the scale there is the system that only runs under Flex or OS-6 and supports a video dial, allows you to prepare messages before going on-line and allows incoming data to be diverted to the disc drive to be read later. With this system, you even get a 51 x 84 display on the Asci program. However the price does tend to put you off somewhat. The real tragedy is there does not seem to be anything in between. A system that would run under BASIC42 or still a for instance. The only advice I can give is get the best you can afford.

It is going to cost you about a pound for 10 minutes during an off peak period. If the board you use has a cost meter facility, then use it frequently and keep a note of the various states over the weeks.

Well Hyperflex has helped any of you contemplating going on-line and so that once you have got your modem you will also have someone to call for included some useful numbers. One last thing to mention before I go is that most of the people that operate bulletin boards have invested a lot of money and time on their system. They are not likely

00000 000000 1000075 0700-776075  
0700-776075  
00000 000000 0075-0100 to 24hrs  
1100 11 000000 1000/75 001-444-1484

All these boards have Dragon sections. A list of boards can be found on the "Data" boards 01-070-1000 for 300000 and 01-070-1000 for 1000/75.

Your local modems are at 0007-0701000 board or leave a message on 0007-0701000.

## Crossword

These second great month of the Dragon Crossword! We have no reports of your virtual veracity yet, because, despite the legend (how you know why it's called a legend) on the front cover, it is still November here in Little Newport Street, none of you have seen the crossword, and only the preexisting telepaths have replied.

Don't forget that there will be a couple of free tapes from the Editor's Magic Botomless Box for the first correct entries to each as each month. You can even try telling us which tapes you'd like in an ideal world. No promises. It all depends on what we have in stock.

And you don't have to put up your Dragon User either — heaven forbid! Entries can be written out on a prospect or a plain piece of paper, as long as we can read them.

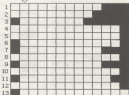
And to be brief:

1. Put your jewellery into fortification (3,7)
2. Bed in Lincoln Green? (5,4)
3. Only things, is dumps (7)
4. Is the Enterprise one? (3,7)
5. Her young char told you he's staring (4,6)
6. Does it fight its battles on the underground? (7,4)
7. A sign of two paintbrushes plus two (9)
8. Old Van Gogh became one? (8,7)
9. Nigel and Alain are both in it (5,4)
10. Gender and grammar is a job in television? Part! (8,8)
11. Make to come into tender rise (4,6)
12. Attack on Sater? (5,7)
13. Rock spot hero claims a soldier (3,7)



by Terry and Derek Prebys

All this month's answers are names of Dragon software. When the crossword is complete, the column marked with an arrow will spell out a phrase.



# Pamcodes

*Pam D'Arcy continues her introduction to machine codes*

I trust that no difficulties were encountered in displaying your name in the top-left position of the screen. My program instructs in **Listing 1**.

I wonder if any readers thought "why not paste the name directly to the top screen area (lines 4-5) on the Dragon" using LDA/STA instructions? Using the "output a character" ROM call \$B000 has many benefits in that it carries out some functions that would otherwise need to be performed within our programs. For instance, if you "poked" a "P" directly into the top-left screen location (\$400).

```
LDH #P
STA $400
RTS
```

— In Basic, POKESHA00,ASC("P"), a capital P would appear. However, anything symbol, capital letters or lowercase letters retain their original values (decimal ASC values, or character codes, 64-95) when being displayed. All other characters have adjustments made to their values to match the needs of the hardware display chips in the machine. I didn't use lower case characters in the display of my name for cleanness, but to make this point. Putting a lower case character into the top left of the screen does not result in the reversed screen (green or black) of character s . . .

CLS (clear the result may be scrolled off the top by the CR display after the POKC command)

POKSHASH00,ASC("P")

(quick memory jogger for those who read it — lower case — reverse screen — letters are obtained from the keyboard by holding down shift and pressing zero, after typing in required reversed characters, repeat shift+0 to return to normal display mode).

If that results in L, what does POKSHASH00,ASC("P") give? The technical reasons for this are discussed in the book inside the Dragon, page 198. As well as carrying out such character code conversions, \$B000 acts as appropriate when it receives an "end of line" or carriage return (CR) character — that is, it clears the rest of the line in spaces and sets the next print position to the start of the next line. It also takes care of scrolling the text screen up one line if the last screen position is being used (\$FFF).

## Keyboard input

Most programs will not be using fixed data as above but will be dealing with information held on a file or being input from the keyboard. We can then substitute printing the fixed characters of a name by printing the fixed characters of a name by printing the name (and other) data as it is input on the keyboard. The program needs to be able to

determine when input is complete, so that it can return to Basic, so you can choose what condition determines that for you. For example, I shall use a press of the ENTER key.

As with displaying a character on the screen, there is a ROM routine that can be used to obtain keypresses. This is at address \$B005. It puts the ASC (two-character ASCII) value of the keypress in register A. If there was no keypress, register A will be set to null (\$00). Using two-character ASCII and prints keypresses until ENTER is pressed. I shall be dealing with branch instructions (\$BCDINE) in a moment.

Line 38 causes a jump back to the "get a character" ROM call if there was no keypress. This forms a "loop" of code that is repeated ad nauseum until the exit condition is met (in this instance, a key is pressed). Line 40 prints the keypress if it is a printable value (for example, left arrow still deletes a character; break is ignored etc). Line 80 checks for the terminating condition — GOMFASH00 contents of register A with the actual ASCII value for the carriage return (written at label GETKEY) (branch not equal). This is a further loop of code that continues until its exit condition is met (enter key pressed).

If there is a program error preventing the exit condition being met, for example, above comparing the keypress with a value that can be input, the program simply sits there, looping away round the code — it never gets stuck! The break key (also button of Basic programs) is ineffective in machine code — well, on our own — so right loops can only be broken by pressing the RESET button.

## Unique labelling

In Basic programs, GOTOs and GOSUBs always jump to a unique location — the line number — which cannot, obviously, be duplicated in a program (the Basic editor comments the original line on any subsequent input of the same line number). Assembly sources use our own label names for moving around programs. Label names must be unique in the program (I'll know which label to use; duplicate names are usually detected in the assembly stage, but the error message may not be very clear — the kind of "phrasing error" or "undefined symbol" (label names are usually referred to as symbols in assembly)) are often caused by accidentally duplicating a name in the label column.

The next screen position maintained by

**Listing 1**

EXPECTED GENERATED OBJECT CODE	LINE NUMBER	LABEL	SOURCE Mnemonic	CODE OPERAND
80 BA 77	10	GO	JSR	\$BA77
86 50	20		LDA	#P
8D 80 0C	30		JSR	\$B00C
84 61	40		LDA	#s
8D 80 0C	50		JSR	\$B00C
84 6D	60		LDA	#m
8D 80 0C	70		JSR	\$B00C
39	80		RTS	
	90			

**Listing 2**

EXPECTED GENERATED OBJECT CODE	LINE NUMBER	LABEL	SOURCE Mnemonic	CODE OPERAND
8D BA 77	10	GO	JSR	\$BA77
8D 80 04	20	GETKEY	JSR	\$B004
27 F8	30		BEQ	GETKEY
8D 80 0C	40		JSR	\$B00C
81 0D	50		CMPA	#5D
26 FA	60		BNA	GETKEY
39	70		RTS	
	80			

The Memory address \$B00C may also be known as a "test screen pointer" or "current cursor address" and is held in the two bytes at address \$B8508. The content of this pointer is another address — the next test screen address to be used for display. When the screen is cleared (CLS), the content of this pointer is reset to the first address of the test screen (\$B00C). When the test screen has been scrolled up or down, the content of the pointer is reset to contain the address of the start of the last line of the screen. \$B85C: Receipt of carriage return characters causes the cursor to be at the address of the start of the next line, subject to a scroll condition being encountered. Unless any of these special cases are met, display of a character causes the address in the test screen pointer to be incremented by 1. Unlike the graphics display even in machine code, the position of the test screen is fixed at \$B00-\$BFF.

To display text at a specific point on the test screen (Basic PRINT is stateless), the appropriate address can be calculated and stored in the test pointer prior to calling the PCMC routine \$B00C. There is one point to remember: byte, so the value should be added to the test screen start address, eg PRINT at 258 is \$400+\$258, or \$400+\$B80, so to print a name as input a 256 could appear as in listing three.

What \$B00C doesn't do is check the character of the pointer is between \$400-\$BFF before it displays the next character (why couldn't it check something that it is in charge of?). As is at machine code or Basic (PCMC) manipulation of Basic's workspace

locations, the PCMC interpreter is expecting everything to be valid to expect results may occur if we step out of line — it cannot distinguish between accidental and deliberate sabotage! As I have said, nature on our part is machine code. This also allows us to cheat the system when it suits us!

## Branching out

The condition code register (CCR) was mentioned in the last issue as being one of the single byte registers on the Dragon. Each of the eight bits has a specific test and the operation or otherwise of a branch instruction depends upon current setting of one or more of these bits, or flags, at that moment. Some instructions affect some of these flags; others none. In general, we should be able to manage without gory detail.

As with the instructions in general, some are used much more frequently than others — and others almost never. It really does depend upon the nature of the program. A common problem with branch instructions is using a signed branch when an unsigned one should have been used — discussed in a moment. One of my greatest programming aids is having copied out table one onto a postcard for instant access.

There are also BEQ (Branch on Equal) and BNE (Branch Not Equal) that act independently of signed/unsigned conditions. BEQ is also a "branch out" instruction with BNE is complement, "branch if not zero".

TABLE OF BRANCH INSTRUCTIONS

SIGNAL	NAME	EQUIVALENT
BZF	BEQ/BCC/NEQ	
BCT	BEQ	
BLZ	BEQ	
BLT	BEQ/BCC/NEQ	
BVC		
BVS		

You can probably well determine the conditions of many of the above branch instructions — Greater/Equal, Greater Than, Less/Equal, Less Than, the V instructions are the less frequent M68000 C68000/M68000 Set — they probably won't be dealt with except in passing in the end of the series. On the unsigned side are High/Low; Carry Clear, Plus; High/Low/Zero; L/Zero; Carry Set/Zero. The BPL and BML instructions are shown in brackets as there are certain conditions when they will give a false condition because of OVERFLOW/underflow. Generally, after arithmetic on signed numbers, use the related signed comparison instructions.

Also in the branch range are BAA (Branch Always); BBN (Branch Never) — of little practical use — it "maintains the symmetry of the instruction set" — all the branch instructions have complementary pairings — BLT/BGE etc. BBR (Branch to Subroutine) completes the branch instructions.

The branch instructions, including BBR, generate position independent code — that is if you take the source code that we have been using so far in this series, apart from the flag of PCMCally being a fixed position, the same saved object code will work whether relocated, say \$B001 or \$B800 or \$B80C (the latter for Dragon 64 users who have mapped ROM to RAM while running 32K mode). This is because our "good" instructions have all been of the position independent nature of the branch instructions, as opposed to JMP! Unlike some machines, there are no conditional JUMP instructions on the Dragon (but we do have goodies that other machines haven't got), so, for illustrative purposes, I shall adjust the second loop exit code of the above as in listing four.

If the object code is saved (SAVEH) "NAME" \$1600,\$1600) and loaded some time in the future at its "default" address (address the code was saved from) and is executed, it will run correctly. However, if it is loaded elsewhere in the machine, unless the first happens is a "enter" (the instruction in line 05, JMP GETKEY is of the extended mode — actual address hyperdiscussed in last month's article, and the address generated within the object code, \$B00C, will be branched to REGARDLESS OF THE PROGRAM'S CURRENT LOAD ADDRESS, leading to potential disaster.

The branch instructions are as useful as they generate code that says "branch to this instruction at + or - a number of bytes from this instruction". Some assemblers permit

Listing 3

GENERATED OBJECT	EXPECTED CODE NUMBER	LINE	LABEL	SOURCE CODE MNEMONIC	OPERAND
BD BA 77	10	GO	JSR	\$BA77	
CC 03 00	14		LDD	\$5100	
DD 00	17		STD	\$58	
BD 00 04	20	GETKEY	JSR	\$B004	
27 FB	30		BEQ	GETKEY	
BD 00 0C	40		JSR	\$B00C	
81 00	50		CMPA	\$500	
26 FA	60		BNE	GETKEY	
39	70		RTS		
	80				

Listing 4

OBJECT ADDRESS	GENERATED OBJECT	EXPECTED CODE NUMBER	LINE	LABEL	SOURCE CODE MNEMONIC	OPERAND
3061	BD BA 77	10	GO	JSR	\$BA77	
3064	CC 03 00	14		LDD	\$5100	
3067	DD 00	17		STD	\$58	
3069	BD 00 04	20	GETKEY	JSR	\$B004	
306C	27 FB	30		BEQ	GETKEY	
306E	BD 00 0C	40		JSR	\$B00C	
3071	81 00	50		CMPA	\$500	
3073	27 03	60		BEQ	STOP	
3075	7E 35 09	65		JMP	GETKEY	
3078	39	70	STOP	RTS		
3079		80				

Continued on page 24





Uniting 3

000000	0.00	0.00	000000	0.00	0.00
000001	0.01	0.01	000001	0.01	0.01
000002	0.02	0.02	000002	0.02	0.02
000003	0.03	0.03	000003	0.03	0.03
000004	0.04	0.04	000004	0.04	0.04
000005	0.05	0.05	000005	0.05	0.05
000006	0.06	0.06	000006	0.06	0.06
000007	0.07	0.07	000007	0.07	0.07
000008	0.08	0.08	000008	0.08	0.08
000009	0.09	0.09	000009	0.09	0.09
000010	0.10	0.10	000010	0.10	0.10
000011	0.11	0.11	000011	0.11	0.11
000012	0.12	0.12	000012	0.12	0.12
000013	0.13	0.13	000013	0.13	0.13
000014	0.14	0.14	000014	0.14	0.14
000015	0.15	0.15	000015	0.15	0.15
000016	0.16	0.16	000016	0.16	0.16
000017	0.17	0.17	000017	0.17	0.17
000018	0.18	0.18	000018	0.18	0.18
000019	0.19	0.19	000019	0.19	0.19
000020	0.20	0.20	000020	0.20	0.20
000021	0.21	0.21	000021	0.21	0.21
000022	0.22	0.22	000022	0.22	0.22
000023	0.23	0.23	000023	0.23	0.23
000024	0.24	0.24	000024	0.24	0.24
000025	0.25	0.25	000025	0.25	0.25
000026	0.26	0.26	000026	0.26	0.26
000027	0.27	0.27	000027	0.27	0.27
000028	0.28	0.28	000028	0.28	0.28
000029	0.29	0.29	000029	0.29	0.29
000030	0.30	0.30	000030	0.30	0.30
000031	0.31	0.31	000031	0.31	0.31
000032	0.32	0.32	000032	0.32	0.32
000033	0.33	0.33	000033	0.33	0.33
000034	0.34	0.34	000034	0.34	0.34
000035	0.35	0.35	000035	0.35	0.35
000036	0.36	0.36	000036	0.36	0.36
000037	0.37	0.37	000037	0.37	0.37
000038	0.38	0.38	000038	0.38	0.38
000039	0.39	0.39	000039	0.39	0.39
000040	0.40	0.40	000040	0.40	0.40
000041	0.41	0.41	000041	0.41	0.41
000042	0.42	0.42	000042	0.42	0.42
000043	0.43	0.43	000043	0.43	0.43
000044	0.44	0.44	000044	0.44	0.44
000045	0.45	0.45	000045	0.45	0.45
000046	0.46	0.46	000046	0.46	0.46
000047	0.47	0.47	000047	0.47	0.47
000048	0.48	0.48	000048	0.48	0.48
000049	0.49	0.49	000049	0.49	0.49
000050	0.50	0.50	000050	0.50	0.50
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000052	0.52	0.52	000052	0.52	0.52
000053	0.53	0.53	000053	0.53	0.53
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### Unit 3: Social Studies

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Year	Age	Gender	Occupation	Income	Assets	Liabilities	Net Worth	Debt-to-Income Ratio	Financial Health Score
2018	25	Male	Software Engineer	\$75,000	\$120,000	\$30,000	\$90,000	0.40	85
2019	26	Female	Marketing Manager	\$68,000	\$110,000	\$25,000	\$85,000	0.37	82
2020	27	Male	Product Designer	\$72,000	\$115,000	\$28,000	\$87,000	0.39	84
2021	28	Female	Operations Manager	\$70,000	\$118,000	\$32,000	\$86,000	0.46	80
2022	29	Male	Systems Administrator	\$73,000	\$122,000	\$35,000	\$87,000	0.48	78
2023	30	Female	Business Development	\$76,000	\$125,000	\$38,000	\$87,000	0.50	75
2024	31	Male	Project Manager	\$78,000	\$128,000	\$40,000	\$88,000	0.51	72
2025	32	Female	Quality Assurance	\$80,000	\$130,000	\$42,000	\$88,000	0.53	70
2026	33	Male	UX Researcher	\$82,000	\$132,000	\$45,000	\$87,000	0.55	68
2027	34	Female	HR Manager	\$84,000	\$135,000	\$48,000	\$87,000	0.57	65
2028	35	Male	Finance Analyst	\$86,000	\$138,000	\$50,000	\$88,000	0.58	62
2029	36	Female	Operations Director	\$88,000	\$140,000	\$52,000	\$88,000	0.60	60
2030	37	Male	Product Director	\$90,000	\$142,000	\$55,000	\$87,000	0.61	58
2031	38	Female	Marketing Director	\$92,000	\$145,000	\$58,000	\$87,000	0.63	55
2032	39	Male	Systems Director	\$94,000	\$148,000	\$60,000	\$88,000	0.64	52
2033	40	Female	Business Director	\$96,000	\$150,000	\$62,000	\$88,000	0.65	50
2034	41	Male	Project Director	\$98,000	\$152,000	\$65,000	\$87,000	0.66	48
2035	42	Female	Quality Director	\$100,000	\$155,000	\$68,000	\$87,000	0.68	45
2036	43	Male	UX Director	\$102,000	\$158,000	\$70,000	\$88,000	0.69	42
2037	44	Female	HR Director	\$104,000	\$160,000	\$72,000	\$88,000	0.70	40
2038	45	Male	Finance Director	\$106,000	\$162,000	\$75,000	\$87,000	0.71	38
2039	46	Female	Operations Director	\$108,000	\$165,000	\$78,000	\$87,000	0.73	35
2040	47	Male	Product Director	\$110,000	\$168,000	\$80,000	\$88,000	0.74	32
2041	48	Female	Marketing Director	\$112,000	\$170,000	\$82,000	\$88,000	0.75	30
2042	49	Male	Systems Director	\$114,000	\$172,000	\$85,000	\$87,000	0.76	28
2043	50	Female	Business Director	\$116,000	\$175,000	\$88,000	\$87,000	0.77	25
2044	51	Male	Project Director	\$118,000	\$178,000	\$90,000	\$88,000	0.77	22
2045	52	Female	Quality Director	\$120,000	\$180,000	\$92,000	\$88,000	0.77	20
2046	53	Male	UX Director	\$122,000	\$182,000	\$95,000	\$87,000	0.78	18
2047	54	Female	HR Director	\$124,000	\$185,000	\$98,000	\$87,000	0.79	15
2048	55	Male	Finance Director	\$126,000	\$188,000	\$100,000	\$88,000	0.79	12
2049	56	Female	Operations Director	\$128,000	\$190,000	\$102,000	\$88,000	0.80	10
2050	57	Male	Product Director	\$130,000	\$192,000	\$105,000	\$87,000	0.80	8
2051	58	Female	Marketing Director	\$132,000	\$195,000	\$108,000	\$87,000	0.81	5
2052	59	Male	Systems Director	\$134,000	\$198,000	\$110,000	\$88,000	0.82	3
2053	60	Female	Business Director	\$136,000	\$200,000	\$112,000	\$88,000	0.83	1

**1. Introduction**

NAME	DOB	SSN	SEX	AGE	HEIGHT	WEIGHT	HAIR	EYES	SKIN	RELIGION	EDUCATION	CITY	COUNTY	STATE	ZIP	PHONE	EMAIL	STATUS	REMARKS
JOHN	1975	123 456 789	M	48	5'10"	180	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1234	john.doe@ny.gov	ACTIVE	
JANE	1982	987 654 321	F	41	5'05"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	jane.doe@ny.gov	ACTIVE	
JOHN	1978	555 123 456	M	45	5'12"	190	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	john.doe@ny.gov	ACTIVE	
JANE	1985	333 777 888	F	38	5'08"	170	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	jane.doe@ny.gov	ACTIVE	
JOHN	1970	111 222 333	M	53	5'15"	200	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	john.doe@ny.gov	ACTIVE	
JANE	1988	444 555 666	F	35	5'02"	160	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	jane.doe@ny.gov	ACTIVE	
JOHN	1972	666 777 888	M	51	5'18"	210	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	john.doe@ny.gov	ACTIVE	
JANE	1980	888 999 000	F	43	5'07"	175	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 6677	jane.doe@ny.gov	ACTIVE	
JOHN	1975	222 333 444	M	48	5'11"	185	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 8901	john.doe@ny.gov	ACTIVE	
JANE	1983	555 666 777	F	40	5'06"	168	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	jane.doe@ny.gov	ACTIVE	
JOHN	1977	777 888 999	M	46	5'13"	195	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	john.doe@ny.gov	ACTIVE	
JANE	1981	999 000 111	F	42	5'04"	172	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	jane.doe@ny.gov	ACTIVE	
JOHN	1973	333 444 555	M	50	5'16"	205	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	john.doe@ny.gov	ACTIVE	
JANE	1986	666 777 888	F	37	5'01"	162	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	jane.doe@ny.gov	ACTIVE	
JOHN	1971	888 999 000	M	52	5'19"	215	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	john.doe@ny.gov	ACTIVE	
JANE	1984	111 222 333	F	39	5'03"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	jane.doe@ny.gov	ACTIVE	
JOHN	1974	444 555 666	M	49	5'14"	198	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 6677	john.doe@ny.gov	ACTIVE	
JANE	1987	777 888 999	F	36	5'00"	158	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 8901	jane.doe@ny.gov	ACTIVE	
JOHN	1976	999 000 111	M	47	5'17"	202	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	john.doe@ny.gov	ACTIVE	
JANE	1989	222 333 444	F	34	5'09"	163	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	jane.doe@ny.gov	ACTIVE	
JOHN	1979	555 666 777	M	44	5'12"	192	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	john.doe@ny.gov	ACTIVE	
JANE	1982	888 999 000	F	41	5'05"	170	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	jane.doe@ny.gov	ACTIVE	
JOHN	1972	111 222 333	M	51	5'18"	210	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	john.doe@ny.gov	ACTIVE	
JANE	1985	444 555 666	F	38	5'02"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	jane.doe@ny.gov	ACTIVE	
JOHN	1975	777 888 999	M	48	5'11"	185	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	john.doe@ny.gov	ACTIVE	
JANE	1983	555 666 777	F	40	5'06"	168	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	jane.doe@ny.gov	ACTIVE	
JOHN	1977	777 888 999	M	46	5'13"	195	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	john.doe@ny.gov	ACTIVE	
JANE	1981	999 000 111	F	42	5'04"	172	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	jane.doe@ny.gov	ACTIVE	
JOHN	1973	333 444 555	M	50	5'16"	205	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	john.doe@ny.gov	ACTIVE	
JANE	1986	666 777 888	F	37	5'01"	162	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	jane.doe@ny.gov	ACTIVE	
JOHN	1971	888 999 000	M	52	5'19"	215	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	john.doe@ny.gov	ACTIVE	
JANE	1984	111 222 333	F	39	5'03"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	jane.doe@ny.gov	ACTIVE	
JOHN	1974	444 555 666	M	49	5'14"	198	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 6677	john.doe@ny.gov	ACTIVE	
JANE	1987	777 888 999	F	36	5'00"	158	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 8901	jane.doe@ny.gov	ACTIVE	
JOHN	1976	999 000 111	M	47	5'17"	202	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	john.doe@ny.gov	ACTIVE	
JANE	1989	222 333 444	F	34	5'09"	163	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	jane.doe@ny.gov	ACTIVE	
JOHN	1979	555 666 777	M	44	5'12"	192	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	john.doe@ny.gov	ACTIVE	
JANE	1982	888 999 000	F	41	5'05"	170	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	jane.doe@ny.gov	ACTIVE	
JOHN	1972	111 222 333	M	51	5'18"	210	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	john.doe@ny.gov	ACTIVE	
JANE	1985	444 555 666	F	38	5'02"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	jane.doe@ny.gov	ACTIVE	
JOHN	1975	777 888 999	M	48	5'11"	185	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	john.doe@ny.gov	ACTIVE	
JANE	1983	555 666 777	F	40	5'06"	168	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	jane.doe@ny.gov	ACTIVE	
JOHN	1977	777 888 999	M	46	5'13"	195	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	john.doe@ny.gov	ACTIVE	
JANE	1981	999 000 111	F	42	5'04"	172	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	jane.doe@ny.gov	ACTIVE	
JOHN	1973	333 444 555	M	50	5'16"	205	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	john.doe@ny.gov	ACTIVE	
JANE	1986	666 777 888	F	37	5'01"	162	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	jane.doe@ny.gov	ACTIVE	
JOHN	1971	888 999 000	M	52	5'19"	215	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	john.doe@ny.gov	ACTIVE	
JANE	1984	111 222 333	F	39	5'03"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	jane.doe@ny.gov	ACTIVE	
JOHN	1974	444 555 666	M	49	5'14"	198	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 6677	john.doe@ny.gov	ACTIVE	
JANE	1987	777 888 999	F	36	5'00"	158	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 8901	jane.doe@ny.gov	ACTIVE	
JOHN	1976	999 000 111	M	47	5'17"	202	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	john.doe@ny.gov	ACTIVE	
JANE	1989	222 333 444	F	34	5'09"	163	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	jane.doe@ny.gov	ACTIVE	
JOHN	1979	555 666 777	M	44	5'12"	192	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	john.doe@ny.gov	ACTIVE	
JANE	1982	888 999 000	F	41	5'05"	170	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	jane.doe@ny.gov	ACTIVE	
JOHN	1972	111 222 333	M	51	5'18"	210	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	john.doe@ny.gov	ACTIVE	
JANE	1985	444 555 666	F	38	5'02"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	jane.doe@ny.gov	ACTIVE	
JOHN	1975	777 888 999	M	48	5'11"	185	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	john.doe@ny.gov	ACTIVE	
JANE	1983	555 666 777	F	40	5'06"	168	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	jane.doe@ny.gov	ACTIVE	
JOHN	1977	777 888 999	M	46	5'13"	195	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	john.doe@ny.gov	ACTIVE	
JANE	1981	999 000 111	F	42	5'04"	172	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	jane.doe@ny.gov	ACTIVE	
JOHN	1973	333 444 555	M	50	5'16"	205	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	john.doe@ny.gov	ACTIVE	
JANE	1986	666 777 888	F	37	5'01"	162	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	jane.doe@ny.gov	ACTIVE	
JOHN	1971	888 999 000	M	52	5'19"	215	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	john.doe@ny.gov	ACTIVE	
JANE	1984	111 222 333	F	39	5'03"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	jane.doe@ny.gov	ACTIVE	
JOHN	1974	444 555 666	M	49	5'14"	198	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 6677	john.doe@ny.gov	ACTIVE	
JANE	1987	777 888 999	F	36	5'00"	158	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 8901	jane.doe@ny.gov	ACTIVE	
JOHN	1976	999 000 111	M	47	5'17"	202	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	john.doe@ny.gov	ACTIVE	
JANE	1989	222 333 444	F	34	5'09"	163	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	jane.doe@ny.gov	ACTIVE	
JOHN	1979	555 666 777	M	44	5'12"	192	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	john.doe@ny.gov	ACTIVE	
JANE	1982	888 999 000	F	41	5'05"	170	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 3456	jane.doe@ny.gov	ACTIVE	
JOHN	1972	111 222 333	M	51	5'18"	210	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 7890	john.doe@ny.gov	ACTIVE	
JANE	1985	444 555 666	F	38	5'02"	165	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 1122	jane.doe@ny.gov	ACTIVE	
JOHN	1975	777 888 999	M	48	5'11"	185	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 4455	john.doe@ny.gov	ACTIVE	
JANE	1983	555 666 777	F	40	5'06"	168	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 2345	jane.doe@ny.gov	ACTIVE	
JOHN	1977	777 888 999	M	46	5'13"	195	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 5678	john.doe@ny.gov	ACTIVE	
JANE	1981	999 000 111	F	42	5'04"	172	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518 555 9012	jane.doe@ny.gov	ACTIVE	
JOHN	1973	333 444 555	M	50	5'16"	205	B	B	F	C	HS	NEW YORK	ALBANY	NY	12208	518			

[illegible]

Alcalá	BA	04	7170	1.8A	1987
Alcalá	CA	04	7171	1.8B	1987
Alcalá	BA	04	7172	1.8C	1987
Alcalá	BA	04	7173	1.8D	1987
Alcalá	CA	04	7174	1.8E	1987
Alcalá	BA	04	7175	1.8F	1987
Alcalá	BA	04	7176	1.8G	1987
Alcalá	BA	04	7177	1.8H	1987
Alcalá	BA	04	7178	1.8I	1987
Alcalá	BA	04	7179	1.8J	1987
Alcalá	BA	04	7180	1.8K	1987
Alcalá	BA	04	7181	1.8L	1987
Alcalá	BA	04	7182	1.8M	1987
Alcalá	BA	04	7183	1.8N	1987
Alcalá	BA	04	7184	1.8O	1987
Alcalá	BA	04	7185	1.8P	1987
Alcalá	BA	04	7186	1.8Q	1987
Alcalá	BA	04	7187	1.8R	1987
Alcalá	BA	04	7188	1.8S	1987
Alcalá	BA	04	7189	1.8T	1987
Alcalá	BA	04	7190	1.8U	1987
Alcalá	BA	04	7191	1.8V	1987
Alcalá	BA	04	7192	1.8W	1987
Alcalá	BA	04	7193	1.8X	1987
Alcalá	BA	04	7194	1.8Y	1987
Alcalá	BA	04	7195	1.8Z	1987
Alcalá	BA	04	7196	1.8A	1988
Alcalá	BA	04	7197	1.8B	1988
Alcalá	BA	04	7198	1.8C	1988
Alcalá	BA	04	7199	1.8D	1988
Alcalá	BA	04	7200	1.8E	1988
Alcalá	BA	04	7201	1.8F	1988
Alcalá	BA	04	7202	1.8G	1988
Alcalá	BA	04	7203	1.8H	1988
Alcalá	BA	04	7204	1.8I	1988
Alcalá	BA	04	7205	1.8J	1988
Alcalá	BA	04	7206	1.8K	1988
Alcalá	BA	04	7207	1.8L	1988
Alcalá	BA	04	7208	1.8M	1988
Alcalá	BA	04	7209	1.8N	1988
Alcalá	BA	04	7210	1.8O	1988
Alcalá	BA	04	7211	1.8P	1988
Alcalá	BA	04	7212	1.8Q	1988
Alcalá	BA	04	7213	1.8R	1988
Alcalá	BA	04	7214	1.8S	1988
Alcalá	BA	04	7215	1.8T	1988
Alcalá	BA	04	7216	1.8U	1988
Alcalá	BA	04	7217	1.8V	1988
Alcalá	BA	04	7218	1.8W	1988
Alcalá	BA	04	7219	1.8X	1988
Alcalá	BA	04	7220	1.8Y	1988
Alcalá	BA	04	7221	1.8Z	1988
Alcalá	BA	04	7222	1.8A	1989
Alcalá	BA	04	7223	1.8B	1989
Alcalá	BA	04	7224	1.8C	1989
Alcalá	BA	04	7225	1.8D	1989
Alcalá	BA	04	7226	1.8E	1989
Alcalá	BA	04	7227	1.8F	1989
Alcalá	BA	04	7228	1.8G	1989
Alcalá	BA	04	7229	1.8H	1989
Alcalá	BA	04	7230	1.8I	1989
Alcalá	BA	04	7231	1.8J	1989
Alcalá	BA	04	7232	1.8K	1989
Alcalá	BA	04	7233	1.8L	1989
Alcalá	BA	04	7234	1.8M	1989
Alcalá	BA	04	7235	1.8N	1989
Alcalá	BA	04	7236	1.8O	1989
Alcalá	BA	04	7237	1.8P	1989
Alcalá	BA	04	7238	1.8Q	1989
Alcalá	BA	04	7239	1.8R	1989
Alcalá	BA	04	7240	1.8S	1989
Alcalá	BA	04	7241	1.8T	1989
Alcalá	BA	04	7242	1.8U	1989
Alcalá	BA	04	7243	1.8V	1989
Alcalá	BA	04	7244	1.8W	1989
Alcalá	BA	04	7245	1.8X	1989
Alcalá	BA	04	7246	1.8Y	1989
Alcalá	BA	04	7247	1.8Z	1989
Alcalá	BA	04	7248	1.8A	1990
Alcalá	BA	04	7249	1.8B	1990
Alcalá	BA	04	7250	1.8C	1990
Alcalá	BA	04	7251	1.8D	1990
Alcalá	BA	04	7252	1.8E	1990
Alcalá	BA	04	7253	1.8F	1990
Alcalá	BA	04	7254	1.8G	1990
Alcalá	BA	04	7255	1.8H	1990
Alcalá	BA	04	7256	1.8I	1990
Alcalá	BA	04	7257	1.8J	1990
Alcalá	BA	04	7258	1.8K	1990
Alcalá	BA	04	7259	1.8L	1990
Alcalá	BA	04	7260	1.8M	1990
Alcalá	BA	04	7261	1.8N	1990
Alcalá	BA	04	7262	1.8O	1990
Alcalá	BA	04	7263	1.8P	1990
Alcalá	BA	04	7264	1.8Q	1990
Alcalá	BA	04	7265	1.8R	1990
Alcalá	BA	04	7266	1.8S	1990
Alcalá	BA	04	7267	1.8T	1990
Alcalá	BA	04	7268	1.8U	1990
Alcalá	BA	04	7269	1.8V	1990
Alcalá	BA	04	7270	1.8W	1990
Alcalá	BA	04	7271	1.8X	1990
Alcalá	BA	04	7272	1.8Y	1990
Alcalá	BA	04	7273	1.8Z	1990
Alcalá	BA	04	7274	1.8A	1991
Alcalá	BA	04	7275	1.8B	1991
Alcalá	BA	04	7276	1.8C	1991
Alcalá	BA	04	7277	1.8D	1991
Alcalá	BA	04	7278	1.8E	1991
Alcalá	BA	04	7279	1.8F	1991
Alcalá	BA	04	7280	1.8G	1991
Alcalá	BA	04	7281	1.8H	1991
Alcalá	BA	04	7282	1.8I	1991
Alcalá	BA	04	7283	1.8J	1991
Alcalá	BA	04	7284	1.8K	1991
Alcalá	BA	04	7285	1.8L	1991
Alcalá	BA	04	7286	1.8M	1991
Alcalá	BA	04	7287	1.8N	1991
Alcalá	BA	04	7288	1.8O	1991
Alcalá	BA	04	7289	1.8P	1991
Alcalá	BA	04	7290	1.8Q	1991
Alcalá	BA	04	7291	1.8R	1991
Alcalá	BA	04	7292	1.8S	1991
Alcalá	BA	04	7293	1.8T	1991
Alcalá	BA	04	7294	1.8U	1991
Alcalá	BA	04	7295	1.8V	1991
Alcalá	BA	04	7296	1.8W	1991
Alcalá	BA	04	7297	1.8X	1991
Alcalá	BA	04	7298	1.8Y	1991
Alcalá	BA	04	7299	1.8Z	1991
Alcalá	BA	04	7300	1.8A	1992
Alcalá	BA	04	7301	1.8B	1992
Alcalá	BA	04	7302	1.8C	1992
Alcalá	BA	04	7303	1.8D	1992
Alcalá	BA	04	7304	1.8E	1992
Alcalá	BA	04	7305	1.8F	1992
Alcalá	BA	04	7306	1.8G	1992
Alcalá	BA	04	7307	1.8H	1992
Alcalá	BA	04	7308	1.8I	1992
Alcalá	BA	04	7309	1.8J	1992
Alcalá	BA	04	7310	1.8K	1992
Alcalá	BA	04	7311	1.8L	1992
Alcalá	BA	04	7312	1.8M	1992
Alcalá	BA	04	7313	1.8N	1992
Alcalá	BA	04	7314	1.8O	1992
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Alcalá	BA	04	7316	1.8Q	1992
Alcalá	BA	04	7317	1.8R	1992
Alcalá	BA	04	7318	1.8S	1992
Alcalá	BA	04	7319	1.8T	1992
Alcalá	BA	04	7320	1.8U	1992
Alcalá	BA	04	7321	1.8V	1992
Alcalá	BA	04	7322	1.8W	1992
Alcalá	BA	04	7323	1.8X	1992
Alcalá	BA	04	7324	1.8Y	1992
Alcalá	BA	04	7325	1.8Z	1992
Alcalá	BA	04	7326	1.8A	1993
Alcalá	BA	04	7327	1.8B	1993
Alcalá	BA	04	7328	1.8C	1993
Alcalá	BA	04	7329	1.8D	1993
Alcalá	BA	04	7330	1.8E	1993
Alcalá	BA	04	7331	1.8F	1993
Alcalá	BA	04	7332	1.8G	1993
Alcalá	BA	04	7333	1.8H	1993
Alcalá	BA	04	7334	1.8I	1993
Alcalá	BA	04	7335	1.8J	1993
Alcalá	BA	04	7336	1.8K	1993
Alcalá	BA	04	7337	1.8L	1993
Alcalá	BA	04	7338	1.8M	1993
Alcalá	BA	04	7339	1.8N	1993
Alcalá	BA	04	7340	1.8O	1993
Alcalá	BA	04	7341	1.8P	1993
Alcalá	BA	04	7342	1.8Q	1993
Alcalá	BA	04	7343	1.8R	1993
Alcalá	BA	04	7344	1.8S	1993
Alcalá	BA	04	7345	1.8T	1993
Alcalá	BA	04	7346	1.8U	1993
Alcalá	BA	04	7347	1.8V	1993
Alcalá	BA	04	7348	1.8W	1993
Alcalá	BA	04	7349	1.8X	1993
Alcalá	BA	04	7350	1.8Y	1993
Alcalá	BA	04	7351	1.8Z	1993
Alcalá	BA	04	7352	1.8A	1994
Alcalá	BA	04	7353	1.8B	1994
Alcalá	BA	04	7354	1.8C	1994
Alcalá	BA	04	7355	1.8D	1994
Alcalá	BA	04	7356	1.8E	1994
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Alcalá	BA	04	7364	1.8M	1994
Alcalá	BA	04	7365	1.8N	1994
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Alcalá	BA	04	7368	1.8Q	1994
Alcalá	BA	04	7369	1.8R	1994
Alcalá	BA	04	7370	1.8S	1994
Alcalá	BA	04	7371	1.8T	1994
Alcalá	BA	04	7372	1.8U	1994
Alcalá	BA	04	7373	1.8V	1994
Alcalá	BA	04	7374	1.8W	1994
Alcalá	BA	04	7375	1.8X	1994
Alcalá	BA	04	7376	1.8Y	1994
Alcalá	BA	04	7377	1.8Z	1994
Alcalá	BA	04	7378	1.8A	1995
Alcalá	BA	04	7379	1.8B	1995
Alcalá	BA	04	7380	1.8C	1995
Alcalá	BA	04	7381	1.8D	1995
Alcalá	BA	04	7382	1.8E	1995
Alcalá	BA	04	7383	1.8F	1995
Alcalá	BA	04	7384	1.8G	1995
Alcalá	BA	04	7385	1.8H	1995
Alcalá	BA	04	7386	1.8I	1995
Alcalá	BA	04	7387	1.8J	1995
Alcalá	BA	04	7388	1.8K	1995
Alcalá	BA	04	7389	1.8L	1995
Alcalá	BA	04	7390	1.8M	1995
Alcalá	BA	04	7391	1.8N	1995
Alcalá	BA	04	7392	1.8O	1995
Alcalá	BA	04	7393	1.8P	1995
Alcalá	BA	04	7394	1.8Q	1995
Alcalá	BA	04	7395	1.8R	1995
Alcalá	BA	04	7396	1.8S	1995
Alcalá	BA	04	7397	1.8T	1995
Alcalá	BA	04	7398	1.8U	1995
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Alcalá	BA	04	7400	1.8W	1995
Alcalá	BA	04	7401	1.8X	1995
Alcalá	BA	04	7402	1.8Y	1995
Alcalá	BA	04	7403	1.8Z	1995
Alcalá	BA	04	7404	1.8A	1996
Alcalá	BA	04	7405	1.8B	1996
Alcalá	BA	04	7406	1.8C	1996
Alcalá	BA	04	7407	1.8D	1996
Alcal					

[illegible]





# Pete GERRARD'S ADVENTURE TRAIL

I'll begin a hymn of praise to the hard working Sandra Sharkey, who will soon be producing as many magazines as she has children (five so far, but only two magazines...yet). Adventure Probe has been going for some time now, a general, forum of hints, tips, solutions, anecdotes and gossip all about adventures. This has now been joined by another magazine called Southsayer, which is TOTALLY maps and solutions. Nothing else, just maps and solutions. Now I know that some of you may disapprove of this sort of thing, but if that's the case, then why do you keep writing to me for help? Personally I'm all for it, and if you want to see a sample issue of either Southsayer or Adventure Probe then send a quid to Sandra at 78 Morton Road, Highfield, Wigan, Lancashire WN3 6BT and a magical invisible wing will fly back to you before you can say Cossack Cave. Proverbs that offer you a single puzzle down the pub. Where were you at the last post-delegate meeting, eh, Sandra?

Mrs Webb of Lapped Lappers is having interesting hints for Fisty Business, where rings, courtesy of Salamander By the Way, Mrs Webb. I saw what was crossed out on your envelope, just why is a person interested in Fisty Business when the company name that was crossed out is String Manufacturing? Fish salamanders and string, oh well, this will put them in their place...

- 1) Everything around here starts under water, which is alright if you don't mind looking like a penguin.
- 2) Don't go too far from the island.
- 3) Laser pistols are really cutting weapons.
- 4) Don't be afraid of the dark.
- 5) Shellfish are great music boxes, but octopussy prefer cake.
- 6) Those castles are too far already.
- 7) Sandra should be read in the right light.
- 8) The strangest things are said behind thrones.
- 9) Ping kings aren't that dumb. Their harem are well hidden.
- 10) It's not easy being green, so be affectionate.

The hake's progress? Ought to be a date hand by now. Sorry, I said that once upon a time.

Atten. Back to the land of adventures again, and once more asked for. This time the game is Madness and Minotaur, the

person is J. Edgar of Windsor (post) I wonder if he could introduce me to Lady O, the company is Dragon Data, so here we go...

## Ask the oracle

- 1) The oracle tells you what you need to kill creatures. Ask ORACLE in first out what you need, get the weapons and kill creatures.
- 2) You must TIE HYDRA with the ropes before you can kill it.
- 3) You can OPEN ORBIT only if you are at peak strength and holding nothing.
- 4) The drapes in the room with the narcissus plants have a 50% chance of opening — you get only one chance to OPEN DRAPES each game (no taking) — this is the sort of stupid problem that should not exist in an adventure.
- 5) The spider will cause any object on the ground in its room to be randomly relocated. The rival will present this, as will placing objects in the 'music' room on the first floor.
- 6) When the 'walls glow in eerie colour' turn off the lamp and LOOK.



7) You must PLAY FLUTE in the 'music' room and hold parchment to see the ledge. Then use rope to CLIMB LEDGE to get a treasure.

8) Many hard to find places may only be reached by jumping to JUMP PIT, JUMP HOLE, JUMP POOL, JUMP MIST, JUMP UP JUMP DOWN, or JUMP.

9) Use ORKAN to learn the secret of the glowing rocks.

10) You need the FOOD (1st floor) and the MUSHPROOF (2nd floor) to learn the first spell.

11) Use VETAR to recover the lamp if it is blown out of your hands, then turn it on.

12) The UPB contains oil to fill the lamp.

13) Once all the spells are learned, some pools of oil may be found at random.

14) ARHINO will use as the search dog. A glowing room will keep you from getting hurt (just take one extra push with me on Friday nights).

15) Dirty lit rooms on the first floor may require a lamp to see everything.

16) LOOK POOL works in sea cave.

I don't know about you, but I didn't like that game at all, as it relies far too much on random events. I'm all in favour of random things happening, as they do in real life so they must in adventures, but this one was taking things a bit far. What do you think?

## Letter time

Pulls a letter from the pile, and finds the name Nick Whelan staring at him. Nick lives at 27 Duke Drive, Clapham, Bedford, Bedfordshire MK43 8GL, and can offer help on the following (forward) or so adventures: Aqueduct 471, for Kinghorn, Bowers of Doom, Tarkov, Penelope Tomb, Caverns of Doom, Jarkapostion, El Gableto, Dragon Mountain, Lost in Space, Cellars Island and Return of the Ring. SAC as usual.

Bartering time, folks, because Nick goes on to say "if anyone has any other following adventures I would be willing to either swap or buy them: Black Sanctum, Stonegarage, Wings of War, Monarchs of Doom, or any Scott Adams adventure". So there you go, you can barter away for your heart's content.

Two of the Scott Adams series of games were the second and third adventures that I ever played, and those were Adventureland and Pirate Adventure! Cossack Cave was the first. By the way, Anyway if anyone can cast



their minds back BDU (Before Dragon Master) is 1978 they may remember an issue of an American magazine called *Byte* which was devoted to adventures. It is therefore a complete listing, in basic for *Private Adventurer*! What would people give for a copy of that now, I wonder.

Don't all writers asking for a copy from me, because I haven't got one, it disappeared in a flouze blow, much to my intense annoyance.

## Scott Adams

I think there must be two categories of people as far as Scott Adams games are concerned: in those early days, with only *Colonel Cave* to compare him against, I marvelled at how he could possibly fit an entire adventure into the computer memory of all at once. Then, as adventures progressed, it began to wonder why he didn't progress as well, even though said writer has told me that his own descriptions are not particularly cumbersome. And look at things like *Phantoms*, *Militations*, and you spend most of your time digging over and over again to find unpleasant games? Okay, he might have had to pay a lot of money for the rights to the character, but dear me, *Spidevman*, too, a popular character but a not very familiar adventure. And yet, the man did a lot of popularised adventures so we can't be too hard on him. It is essential to have a few more behind *Infocore* we might never have had adventures on home computers at all.



Looked through rest of letters, requests for help and hint sheets, so I shall take the easy step of printing the rest of the *Spidevman* solution, since still get millions of letters about it. Well, okay, I exaggerate slightly, thousands there. Without the benefit of a wonder memory I cannot recall whether it was the November or December issue which featured the first ten steps of resolution, used in case you're wondering why I don't just look it up it's because this is being written before I've seen either of those two issues, and our beloved editor has the power to print or not to print, as she sees fit (I just put these things, I don't remember them — Ed.) up to Master's indignation and clearing the corridors. This is irrelevant to them, so don't read it if you don't want to know.

11) Go to the other main computer and look at screen.

12) Go to the transporter and enter co-ordinates for planet (see below), be sure to save game here so that it can be returned to later in the event of a disaster.

13) Go to the planet and hit off the cart.

14) Listen, and if you can't hear anything then go back to step 12, repeat, and repeat until you can hear something.

15) When there is a sound, GET COMMUNICATOR and USE COMMUNICATOR.

16) Enter co-ordinates for Emerald.

17) Get emerald and return using communicator.

18) Go to Darth Vader by the transporter.

19) Kill him.

20) Return using the communicator again.

21) Go to the lift and press the button twice.

22) Go through the forcefield.

23) THE END

Note: don't forget to breathe at places other than the safest corridor from step 10 onwards.

Co-ordinates for transporters: Planet 0-4-1-5, Emerald 2-7-3-5, Vader 1-4-0-0.

For each place enter each number by pressing that number and at the end of the row you must **PULL LEVER**.

The problem of getting lost in the large forest with the strange light is solved quite simply by not going there!

End of solution, end of game, end of column! See you next month.

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# Write: ADVENTURE

*Pete Gerrard gets a game gang together*

Last month we had to make problems and death dragons, and hence no programming. The month before that, however, I did admit we'd be talking about introducing characters into games, and now with happy dragons once more by my side, that's precisely what we're going to be doing.

In the October issue of *Dragon User* we touched on simple, individual characters who performed simple, individual tasks. They either attacked you, or stole things from you, or perhaps solved a riddle or two for you by carrying things, accepting things, performing some task that was beyond the talents of the main hero of the adventure — you! They might have been able to reach something you couldn't or possibly they had the ability to swim across against the waves' face, but whatever it was I generally consisted of something that was pretty straightforward.

In short, they didn't really do very much, and programming that sort of character into your adventure really isn't an easy thing to do. More complicated are advanced characters or grouped characters, although I introduced the third in this issue of *Adventure Connect* (once a local adventure magazine, now moved down to Bournemouth) did touch on this topic by giving us one way of having an individual adventurer (or, of course, have a group of people in the game).

However, there we had the group behaving very much as one would expect an immediate object to behave: it was refused from one room to another, and didn't really play much part in the game, other than allowing someone to mingle and perhaps achieve something that would be impossible for a more conscious person roaming about by themselves.

So this month we'll be looking at more 'human' characters, or at least characters that have at least of personality about them, with perhaps a start here in the direction of having lots of characters, time and space permitting of course.

## Single Characters

I'm all for making adventures as realistic as possible, and just as in real life we wouldn't expect anyone to carry around a whole lot of bulky objects at a time, that is the best we would impose on the program. But, it doesn't seem to make sense to allow the person to carry anything else because it's holding too much. Bearing the immense load of six sheets of paper and failing to have the strength to pick up a key is quite ridiculous, as is the equally absurd situation of being able to take the strain of, say, six full-drawn steel bags of coal. So, objects are given ratings which relate to their weight. The player is given a strength factor, and as his

strength goes up and down during the course of the game he can carry more or less objects. All the time, though, the objects that he can carry have a practical limit imposed upon them: with around with five hundred sheets of paper and if you want, just one bag of coal. All of this brings us to one of the most important factors that we can give our intelligent single character, and that is the factor of strength.

Making this stronger than the adventurer treats that the can carry something that the adventurer can't, and thus he will have at least one thing to do in the game. Perhaps it might take two of you to carry a spectacular object from A to B: get our friend to help.

## Help Offered

Intelligence, which is obviously something you'll need to solve the game, is something else that we can endow our characters with. It is, after all, one of the traditional six attributes that are imposed on players in the world of *Dragons and Dragons* and other role-playing games.

Suppose the player is faced with a conundrum. He might have to, for example, water a plant in order to make it grow, but the only thing he can find to carry the water in is a bucket with a hole in it, and however fast he runs he always finds that the water has run out before he gets there. Clearly the bucket has another purpose, since there is nothing to block the hole up to better, or is there? Something else to think about.

Instead of using the more familiar HELP routine, where the program usually prints up some menu command about not understanding you, or refusing to offer help unless you send off a postal order and take out a year's subscription to *Pigeon Pander* (I'm sorry or something just imagine all those boxes in bars, saying 'pigeons, saying 'yes, I don't feel fancy that one'), you could have the other character offering help and advice when asked. Always provided he's around, of course, and hasn't perished and fallen by being caught in a run-around with a rapidly emptying bucket of water. If he sits down and starts singing about gold, well, that's your problem.

When I say 'he', by the way this is not me being sexist or anything, I just hate writing out 'he' or 'her' all the time. Use whatever you feel like, they both have their uses! Perhaps you might like to leave it to the player to decide, and adjust everything accordingly: less strength, more intelligence, or however you want! Don't fail to write in your complaint, if you.

Another often constraint usually imposed upon you in a role-playing game is that of clarity: hard-to-see co-ordination, that kind of thing. Thus you could easily give the player, and the character, a clarity rating, so that, for example, a player with a clarity rating combined with a character who has a clarity rating would not spot a trap until they fell in to it. But two characters who are very clear-sighted could easily spot a trap in a long row of suitably placed trees and get on with things, much more easily.

By giving the player, and any other characters who come into the game, these ratings of strength, intelligence and clarity, you make the game much more realistic, however un-realistic the setting for the adventure might be. Perhaps, instead of setting the ratings for yourself, you let the player choose them, giving him a maximum total of points to choose from. Someone might settle for lots of strength, and have little left over for intelligence and clarity, thus ending up the Dumb-out of *Crossroads*; which is certainly a fate worse than death, as I'm sure you'll agree.

Other players might opt for lots of intelligence, and end up with the intelligent dexterity of a banana skin. The game thus becomes far more than a simple solve this problem, collect that treasure, often. The attributes for the characters in the game you would, of course, select for yourself, in adventures, as in life, you can determine those of other attributes to large extent, but you can't determine those of people, which makes the adventure, like life, all the more interesting.

You might keep those three as three distinct variables, each one being affected by the various situations encountered during a game. Eating and drinking might increase strength but decrease clarity if you overdo it. Finding a book in a library or a map on the floor might increase intelligence, and so on.

## Character Building

But all of this is tons and if you don't tell the player what the character actually looks like. Saying 'a dwarf is about to be hanged here, and he's a bit of a scum' is a little disappointing (know I'd get him in somewhere) at least makes you think of something typically dwarfish, but saying 'a man walks out from behind a bush and another you think his name is John Smith' gives you absolutely nothing to go on apart from the fact that he looks behind a bush and pounces on unwary adventures. I'm not implying that you launch yourself into something after something of Barbara Cartland style pose (heaven forbid), but you should give the player some kind of impression of his new acquaintance, the might be a tall, thin, lanky fellow looking like Father Christmas, short or tall, it only takes a few words to convey the necessary information.

Having done all that you're in much more of a position to give your games that certain

something that all good adventures have lots of atmosphere. It doesn't take massive room descriptions and hologram graphics to do that. Just a little of common sense and some careful programming will do the job equally well.

## Balanced Talents

A realistic adventure is always going to be better (and sell more) than an unrealistic one, and one way of doing that is to look after your characters. Give them the various attributes and they become alive, playing a role part in the game, and apart from increasing the quality of the game they also allow you to set much more ingenious puzzles for the player to solve. Never make it impossible puzzles, because even if someone or whatever bizarre reason defeats an intelligence of 240, they should still be able to complete the game. You might like to consider the following: that the player selects by choosing suitable settings for your other characters. If the player decides to have no clarity whatsoever you would give the other character the ability to carve a scale model of a spider web with a diamond and a match, thus ensuring that everything remains the same overall and that every problem is therefore solvable. One thing that we haven't really touched on, and I'm sure this will be a topic dear to our beloved editor's heart, is the subject of women in adventures.

Why is it just about every adventure devoted to the male persona, and this people make because they can't think of any original problems any more? Okay, two of the mighty 16 colour adventures gave you the opportunity to control a female heroine, and the game adjusted itself accordingly. On at least I hope so, playing as a female I never made it to the villain's lair or home of the game!

But generally speaking, in typical adventure casts the hero is a male of the Rambo

(I can't spell Arnold, what's wrong with me!) variety, and if he, sure there's mileage to be had in exploring the female side. And not just as the kind of female that adventure uses when promoting Barbarian-type games either: Marie Whitaker might earn her fees as much as the prime minister, but then (as the Mail on Sunday put it) she's got five times as much on her front beach. Many people find that sort of image offensive, and just as not all male adventures look like Arnold so not all female ones look like Marie.



## Conclusion

I haven't quoted somewhere that around 30 per cent of adventures are for women. Where they get these figures from I have no idea, but there you go. I've off about games again — did I? Thus there is obviously a lot of female interest out there, and so I would like you to write new problems to ponder rather than the usual adventure scenarios. I mustn't supplant that you go on an out and out feminist campaign, but it would make a change. Orwell, having no doubt stirred up a hornet's nest I shall tread quietly from the scene until another month is by. There we'll get back to adding a few verbs to our adverbs, and give you another insight into how a game is put together. Plenty to think about, in terms of characters (male or female) (other about Luggage? Is this man an object?) so until then, goodbye.

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you to calculate the number of bytes yourself (BANK \* -20, for example), but the easy way is to always give the destination instruction address and the branch offset. This way, the assembler calculates the number of bytes between the destination and the branch instruction for us — and then change the number of instructions between the two locations. A re-assembler automatically generates the revised value whereas if we wish to be the computer and assemble each `if + n` or `if -` form, we need to check and re-evaluate new values prior to each assemble.

There is a limitation on the distance between the branch and destination of `+107` and `-128` bytes from the `offset` byte (branch instruction) `if +` start offset instruction following the branch). However, this does not limit our program capability as if greater distances are involved (and the assembler will usually flag an instruction as an error if the distance is exceeded), all the branch instructions may be prefixed with `L`, for Long, `LBRANCH`.

etc). These allow two bytes for the `if +` value, allowing distance of `+32767` and `-32768` bytes to be reached — which, as the total memory of an unmodified Dragon is 65536 bytes, enables every possible location to be reached.

We have mentioned `+` and `-` numbers here, which is where "signed" and "unsigned" values come into focus. However, if that's going into detail at this point, the Editor's guideline will come into greater focus. So, really, further detail will have to wait until next month.

### Workout

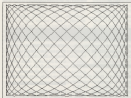
Meanwhile, as programmers, we need to protect our programs from operator misuse, either accidental or deliberate. The PRINT `g`-code above contains a weakness that can be exploited by a user — have you found it? There is a check in the `$B000` routine that prevents the display of the left arrow causing the text pointer to fall down below address `$400`. However, in the PRINT `g`-code version, have you tried left

arrow beyond the amount of data you have already (if any) input then carried out further keypresses? To prevent this, we must decide either not to allow use of left arrow for measure (unfriendly) or to insert our own check that if left arrow is received, only allow it to be displayed if `offset` there is data to be scanned (current pointer contains value `>$B000`). The CalcPare instruction cannot directly compare the contents of a single double byte with another memory location or actual value; one or other value must be in a register. We do not want to consult the contents of register `A` prior to knowing whether it is to be displayed or ignored, so register `D` should not be used for the compare; use register `X`. By adding in instructions to the PRINT `g`-code version to both prevent use of left arrow for measure and a further version to allow use of left arrow for measure but to prevent against backspacing beyond `$B000`.

Next month, at last, we will make a start on building programs that won't run on our machines because of their position dependency.

# Down in the dumps

*Dragon User presents a screen dump for the Memotech DMX80*



LINE 50 resets printer. Clears any commands you have already given it.

LINE 60 sets printer to "Emit" mode, otherwise you get oval circles.

LINE 70 Standard bit image designation command.

LINE 80 to 100 collects the data from each row across the screen. 8 pixels high.

LINE 110 set line feed to BYT2 inch, to get no gaps between the rows, and then gives the line feed command.

LINE 120 instructs the next line to be scanned or, if the whole picture is complete, ends the program.

`$B000` is very good for screen dumps because it is so easy to alter to suit your own particular printer. As far as I know, the Memotech is almost the same as the Panasonic and some Sanyos, so hope this dump is going to be useful to quite a few Dragon owners.

Although this dominates 5 minutes (providing your Dragon can handle lines 40 and 100) code to job, the beauty of it is that it can be altered so easily.

```
10 *SCREEN_DUMP - MEMOTECH DMX80
20 *PRICE TOBSEND - (C) - 4/6/87
30 MODE4,1:SCREEN1,0:Y=0
40 FORC$495,0
50 PRINT#2,CHR$(27);"P";
60 PRINT#2,CHR$(27);"P";CHR$(0)
70 PRINT#2,CHR$(27);"K";CHR$(0)
80 FORC=0TO255
90 A=PPRINT(X,Y)4128+PPRINT(X,Y+
1136+A+PPRINT(X,Y+2)832+PPRINT(X,
Y+3)1152+PPRINT(X,Y+4)16+PPRINT(X,
Y+5)16+PPRINT(X,Y+6)16+PPRINT(X,
Y+7)
100 PRINT#2,CHR$(15);NEXT
110 PRINT#2,CHR$(27);"A";CHR$(8)
120 Y=Y+8:IF Y>19 THEN 130 ELSE 70
130 FORC$494,0
```

# Winners and Losers

Entry month  
Gordon Lee will  
look at computer programming

HOW do you perform a calculation such as  $2^{10} \times 5 + 1$  with absolute accuracy? This was the problem posed in August's competition, and one method of solving this and other similar problems is discussed, beginning on page 25 of this issue.

Having come up with a possible answer, by whatever means, this is one type of question in which one does not immediately appear if the result obtained is the correct one. This proved to be the case in a number of incorrect answers which were received from readers who were clearly unaware that their solutions were wrong.

Fortunately, there are a number of checks which can be applied in order to detect any possible error which might have been made. Note that the use of these tests does not guarantee that the solution is correct, but they can often be used to eliminate an incorrect answer. If an answer passes all of these tests then the odds in favour of it being correct increase correspondingly.

So, let's take the calculation given and apply some of these tests. Our first test would be to ask the computer to print out an approximate answer: PRINT 217915.

As this is still inside the 'overflow' capability of the Dragon, the answer is 144444000 + 220 in hex. From this we now know that the correct answer begins with the digits 144444... and that 220 shifts with the decimal point 20 places to the right... is found with a 24 digit number in calculations of this magnitude, don't assume that all of the digits displayed are correct ones, but you can be certain of the first five digits. Even if the computer were greater than the Dragon could handle, we could still use ordinary common logarithms to get an indication of the magnitude of the answer together with its first couple of digits.

Now we ought to turn our attention and look at the last few digits of the answer. The listing here performs the calculation given in the competition question, but it restricts its attention to just the final few digits. Each time the calculation exceeds a total of six digits the excess are relentlessly yanked off the RIGHT-hand end of the number. Consequently, the final six digits which are printed out are the precise six which will appear at the right-hand end of the final solution. We now



know that the answer will be a 24 digit number in the form: 14444... 847441.

Having established the range and last of the answer, what about the middle? Unfortunately, there is no easy way to determine this (except by solving the puzzle) — but there is a useful negative test which can be applied which uses digital roots.

The digital root, or DR, of a number, is the

digit which remains when the are added together until a single digit remains. The digital root of the current year, 1988, is 8, since  $1+9+8+8 = 26$ , and  $2+6 = 8$ .

Whenever an operation is performed with two numbers the result submitted in the corresponding digital roots. For example, if 1988, which has a DR of 8, is squared, the answer will have a DR of 1, because  $8 \times 8 = 64$ , and  $6+4$  has a DR of 1. The correct answer, 3952144, does indeed have a DR of 1. Otherwise we should check for an error.

We can now apply this test to the competition. First, look at the first few powers of two: 2, 4, 8, 16, 32, 64, 128, 256, and so on. These are the powers of two which have DRs of 2, 4, and so on. Note how they repeat in cycles of six numbers. This tells us that  $2^6$  has a DR of 1, as do  $2^{12}$  and  $2^{18}$ . This is true of any power of 2 in which the power is a multiple of six. This means that  $2^{20}$  would have a DR of 1 and that consequently  $2^{20}$  has a DR of 6. If  $2^{20}$  is then multiplied by 5 (as in the next stage of the computation), the answer will have a DR equal to the DR obtained by multiplying the existing DR of 6 by 5 — is a DR of 4. If 1 is added finally to this we get a DR of 5, which should be the root of the final answer (and indeed it is).

It must be stressed again that by passing all of these tests the solution is not definitely correct, as two or more could conceivably satisfy all of them, but it would give a strong indication that the answer was OK. However, if any single test were failed, then the answer would have been definitely wrong. When this examination of all of the incorrect answers submitted, none passed all three of these tests.

```
10 N=1
20 FOR P=1 TO 75
30 N=N*2
40 N%=STR$(N)
50 IF LEN(N%)>6 THEN N%=RIGHT$(N%,6)
60 N=VAL(N%)
70 NEXT P
80 N=N*5+1
90 PRINT N
```

## Communications

Put down your problem on the communication problem-solving page as provided together with your name and address and send it to Communications, 1250 Little Wagon Street, London WC2H 9PP.

Problem .....

Name .....

Address .....

## Adventure Contact

To help detailed adventures further, we are instituting an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline, 1250 Little Wagon Street, London WC2H 9PP. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trail to write to as well!

Adventure .....

Problem .....

Name .....

Address .....

# Happy New Year

Gordon Lee can't even get to 1988 without making a puzzle out of it . . .

WHenever the competition involves using numbers greater than those that the computer can normally handle, inevitably creative lots of letters from readers reporting that their attempts and/or an overflow error stopped the computer. So here is a step-by-step introduction to the method that the Dragon can use to perform calculations on numbers with hundreds (or even thousands) of digits.

First of all it is necessary to understand the limitations of any machine. Ask it to multiply 7654321 by itself and it will display the correct answer, but try to multiply this same number by itself, and the answer given is only the approximate value 5.824420E+13. The E+13 is the computer's way of indicating that the decimal point of the displayed value must be moved thirteen places to the right giving a 'real' value of 58244200000000. The closer not these, of course, that the true answer ends in seven zeros, merely that the computer can only handle relatively small number of digits with absolute accuracy. It is possible to store a few more digits out of the computer as the internal registers contain more digits than are displayed on screen, but these cannot be relied upon to be accurate. The calculations, therefore, should only be regarded as correct to about nine significant figures. On practical level this would, for example, allow you to measure the length of the equator to an accuracy of a few feet — but in mathematical theory and some of our competitors this isn't enough!

One way of overcoming this problem is by using string variables to hold the digits being operated on. Clearly, it is not possible to multiply, divide, subtract, or, in the mathematical sense, add strings, but by converting

each digit to a numeric variable as it is required, large computations can be made. There is nothing complex in the mathematics either — the method being to simulate that used in the 'pen and paper' way of performing the calculation. Let's take a simple example of multiplying 987654321

by 4. Mathematically, we would take each digit in turn, starting at the right hand end, and multiply it by 4. Any product greater than nine would result in a 'carry' which would be taken care and added to the next stage of the calculation. Now look at listing one which performs the calculation using this precise

## Listing 1

```
10 AS="987654321" LB=0:CB="":CARRY=0
20 FOR P=LEN(AS) TO 1 STEP -1
30 W=VAL(MID(AS,P,1))*4+CARRY:CARRY=0
40 IF T>9 THEN CARRY=INT(W/10):W=W-CARRY*10
50 SB=SB+STR$(STR$(W),1)+CB
60 NEXT P
70 IF CARRY>0 THEN SB=RIGHT$(STR$(CARRY),1)+SB
80 PRINT SB
```

7129076834	.....AS
3743130729	.....BS
64181691586	.....L9(1)
14258153668	.....L8(2)
49903537838	.....L9(3)
57033614692	.....L8(4)
14258153668	.....L9(5)
7129076834	.....L9(6)
21387230502	.....L9(7)
42774461004	.....L8(8)
49903537838	.....L9(9)
14258153668	.....L9(10)
19498557611271763986	.....29

## Prize

It's a while since we had an adventure up for offer on the Puzzle Page. John Smallwood, author of the adventure *Larkspur Wizard is Trapped*, has offered us five Larkspurs, and a set of discount vouchers to another 15 lucky winners of *John's Christmas*.

## Rules

AS soon as you have made it across the gap from 1987 to 1988 (in fact, if your DV gets there on time, you can do it between the turkey and the pudding, if that's how you see your merry and dead), settle up a printout, tell us your answer (don't let what someone did last month or else) include the listing without an answer attached to it, with any program notes you want (don't be mean, complete the marker, and make a note on a separate sheet (JAGUARY) CCAMEY MINCE to the usual address.

For the illustration, I want you to write another version of *Angels* or come one, be fair, any other piece of Yuletide music

which has really been driving you up the wall recently. It only needs to be two lines, but it must be in keeping with the spirit of the festive season, whatever you perceive that to be.

## October winners

This proved a popular competition and we saw a higher-than-usual number of new faces among the entries. We also had a high proportion of correct entries, but boy, it's a good thing we don't deduct marks for mistakes (or whatever the opposite is, Healers?).

The winners are: Robin Telford of Sale, John Smallwood of Preston (we agree next month and save yourself a few bob, John), C. H. Barber of Swale, Denis O'Malley of Cumbernauld, William of Bedford, Fred Wilkes of York, David Hallam of Denmark, J. Smith of Tynsted, Alan Thomas of Southend, Phil Sapiro of Liverpool, Austin Harderson of Bournemouth, D.J. Gley of Middlesbrough, Mark Tinsford of Long Eaton, C. Hutchinson

of Middlesbrough, S.A. Siddons of Clewley, Nils Lindgren of Sweden, E.A. Newman of Adelaide, Don Robertson of Essex, I.J. Huggins of Casperbury and Randy Longshore (that is, unless in Sins-dans, Randy, but we don't take the record for your first name yet) of California.

There were quite a few good illustrations, including a short poem from Randy, having personal favourites: "I go to work on an egg because the opposite always gets stuck in a jar" from I. Huggins, *Best Laid Note* from Alan Newman, who means that the Penelope had stuck into his Dragon and deleted his original solution. Anything to keep them away from Star Wars, Otter.

The prizes for the October comp were a batch of *Checker Apps* and *Screaming Abacus* kindly donated by Harry at Computape, one of the Dragon's longest serving, and most consistent supporters. See you at the Show, Harry.

## Solution

This month's solution should be opposite

method but arranged into a program which the computer can handle. Line 40 stores the nine-digit number in A5, and the digit by which this is to be multiplied in the numeric variable B. The final product will be stored as a string Z5, initially defined as an arbitrary, and any "carry" in the appropriately named variable, again initially set at zero. The loop lines 20 to 40 takes each digit in turn from the right hand end, multiplies by B and adds the "carry" (if any). Note that once the carry is added it is reset to zero. The value of this individual calculation is checked to see if it is greater than 9 — let's call it here is a carry to be taken on to the next stage. This is done at line 40 which also gives a revised value for V its carry made. Finally, the resulting digit is converted to string format and is appended to the left hand end of Z5, thus building up, digit by digit, the final product.

## Dragon ghost

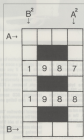
The only irregular command in this listing is the use of the `PRINT` instruction on lines 40 and 70. Regular readers of this column will realise that this is because of the "ghost" blank character which the Dragon possesses on the left hand end of any string variable created by use of the `STR$` command. Once the left hand digit in A5 has been reached it is then necessary to append any "carry" (if there is one), so that the final result is now held in Z5. It is important that this listing, and the theory behind each of the instructions, is understood before considering the next stage — that of the multiplication of two large numbers.

Figures are making multiplication of two 10-digit numbers, much as it might appear (theoretical longhand). By modifying listing one it could be an easy matter to store the second 10-digit number as string Z6, and

then take each digit in turn from this second string and multiply in the manner already outlined the value held in A5. The resulting sub-products could then be stored, for example in an array, before being finally totalled up to give the final result. The disadvantage of this is that memory needs to be used simply to store all of these sub-products until the final totalling.

## 1000 bytes

In the example given this is not a problem as there are only ten lines of digits each con-



taining ten or eleven digits, but if the numbers being multiplied contained a hundred digits, it would be necessary to reserve 10,000 bytes of memory for this purpose. The way around this is to add each digit as it is computed immediately to the appropriate digit in the final product, Z5. In this way the space used for the array can be eliminated and the only memory you reserve string memory for the two numbers, being multiplied, and the final product. In the case of the two 100 digit numbers mentioned, this would only be up to 400 bytes — quite a saving on the 10K which would otherwise be necessary.

As an example of how this would work take the third column of digits from the right in the long multiplication shown. Here we have to add the digits 5, 8, and 8. The sum of 21 means that the first will appear as the third digit from the right in the final product, and a 1 will be carried over to the fourth position. This carry will be the total of 1, 8, 3, and 2, plus the 1 carried, giving a final digit 3, with, again, 1 to carry.

In order to do this we need to initially define Z5 as a string of zeros long enough to contain the final product, and to have a means of knowing the position within this string to which each individual digit must be added. Next month we will be taking a look at how this can be achieved.

## Competition

To commemorate the start of the new year, this month's competition is a crossnumber puzzle based on the year which has just ended, 1987, and one which has just begun.

In the grid below these two dates have already been entered. What you have to do is find the words A and B such that they, and their squares, can be fitted into the grid.

# The Answer

This is Gordon Lee's own solution to the November competition — see page 26 for results

**ANSWERS:** the boxes should be filled as follows:

- (a) Triangular: 36, 1225, 4166
- (b) Triangular: 10, 100, 1540
- (c) Triangular: 16, 81, 20033
- (d) Square: 64, 729, 4096
- (e) Square: 4, 16, 60
- (f) Square: 1, 16, 60

**SOLUTION:** The competition was related to the relationship between the five main types of figure numbers. As was stated, certain of these have been proved to be impossible, and one — a tetrahedral number which is also pyramidal — although not disproven, is extremely unlikely. If such a number exists it will be very large.

The list above in sections a to f gives, in each case, the three smallest numbers (not counting 1). Sections a and f show the only possible answers that exist — a fact which has been proved mathematically.

The listing given compares two types of number and examines the relationship between them. Numbers which correspond are printed out. In the example given the

squares and triangular numbers are being compared. Starting with A=1 and B=1, each pair of figure numbers is generated in turn. The logical method would be to generate one of these figures in turn and then test a series of the other type of number to see if the two values match. This would result in a lot of duplicate working by the computer so a much quicker method is used here. Note that TA is the value produced from A by formula 1, and TB is the value produced from B by formula 2. These two values are compared. If TA is larger than B is increased

before the next test. If TB is larger than A is increased. In this way the higher orders of figure numbers can be tested without any duplication as the values "leapfrog" over each other in turn. If two values are found which match, the result is printed out as these values are what we are looking for. When this happens, one of the generating values is incremented and the search continues. Inter-programming A which is increased but B which is equal will have been B.

By changing the formulae in lines 20 and 30, the different relationships can be tested.

## Listing A

```
10 A=1:B=1
20 TA=A*(A+1)/2:REM Put Formula 1 here
30 TB=B*B:REM Put Formula 2 here
40 IF TA=TB AND TA<1 THEN PRINT A;"
";B;" " ;TA
50 IF TA>TB THEN B=B+1:GOTO 30
60 IF TB>TA THEN A=A+1:GOTO 20
70 A=A+1:GOTO 20
```

# Dragon Answers

If you've got a technical question write to Brian Cudge. Please do not send a SAE as Brian cannot guarantee to answer individual enquiries.

## ROM can't be a RAM

I need a RAM pack for my Dragon32 (only 8K is needed). Is it possible to remove the fast approx. 1000 bit (fast access cartridge interface) two 6K RAM chips to make 8000 to 80000 RAM?

Are there any RAM packs for 8K available on cartridge?

Phil Collaghan  
34 Montrose Road  
Moss Pit  
Stafford

UNFORTUNATELY you cannot simply replace a ROM chip with a RAM chip, as the cartridge does not have all the necessary read/write circuits needed for RAM. It is certainly possible to attach extra RAM to cartridge forming all of the important ROM pins on front and rear of the cartridge port. The problem is that no one seems to make this (obvious) product for the '32 — unless one of our readers knows differently!

## Binary coded decimal

I have recently started to write BBC assembler and have come across 'binary coded decimal' in some time manuals I have. Could you explain what this is and what it is used for?

Chris Field



80000 space have been it isn't really practical to give a full blown explanation of Binary Coded Decimal (BCD), but I'll try and give you the absolute basics.

Normally, one byte stores a number from 0 to 255 using eight bits. In BCD the byte is divided into two four bit 'nibbles' which can each hold a number between 0 and 9 (the values 10 to 15 are not used in BCD).

For example, the number 42 would be stored in the following way in binary and BCD:

Binary: 00000011 — 64+0+1 = 67  
BCD: 00000111 — 4 (binary) and 2 (BCD)

Binary Coded Decimal was originally intended for use where exact precision was required, but as

obvious application for us is storing and updating scores in a machine code game. If you use standard binary, then converting this into Ascii screen characters is not very simple, however, a BCD byte can simply be converted as follows (assuming BCD score is in B register): (see listing one).

A special instruction 'BAA' exists to adjust the accumulator after a BCD addition. So to add 5 to the score (again assuming BCD held in B), the following routine could be used: (see listing two).

Of course, only numbers between 00 and 99 can be stored in a BCD byte. I suggest you look at Programming the Dragon by Cude for more information on BCD.

## Maplin muddle

COULD you help me with a problem I have interfacing the Maplin Dragon 32 MO carrier to my Dragon 84P? The instructions put the operation of this module in BCD, but I don't seem to be able to make the module work on my '84. I would appreciate your comments.

A. Ahmed  
Kilwin Collage  
Kilwin Place  
Birkbecker  
Middletown  
W. Yorks

THIS was a problem which I have come across before (on an enhanced cartridge I released a few years ago). On the Dragon 32, it is possible to interface an I/O port at address 80000 with minimal dressing. However, as the '84 the address select circuit is more complicated and I/O ports must be fully address selected using all 16 bits.

The problem seems to arise in circuits designed for the Dragon 32 before the '84 was released. Although valid for the '32, this 'quick and dirty' decoding will not work on the '84.

## The sharps from the flats

I have a copy of the 'Composer' program for my Dragon which I bought second hand. Also, I have no manual for this. I think I have just about to know the whole system, but although I can enter sharps in the data statements (e.g. 'A' seems to do the trick), I cannot find how to enter 'flat' or 'double dotted' notes. A single dot works for a dotted note, but '...' does not work for double dotted. Can you help?

David Lane  
Farm Cottage  
Donisthorpe  
A. Lincoln

A flat note is denoted by an underlined sharp after it (eg. A<sub>b</sub>) as is another way to a sharp note (eg. C<sub>#</sub>). Double dotted notes are marked with a colon (eg. A::) at the end of the line.

PSCOR	TFR	B,A	
LSRA			* Get upper nibble
LSRA			
LSRA			
LSRA			
ORA	#48		* Convert to ASCII Code
JRR	PRT		* Print the char in A
TFR	B,A		
ANDR	#15		* Get the lower nibble
ORA	#48		* Convert to ASCII Code
JRR	PRT		* Print this digit
RTS			
INCSC	TFR	B,A	* Get score in A
ADDA	#5		* Add 5 to it
ORA			
TFR	A,B		* Put back in B register
RTS			